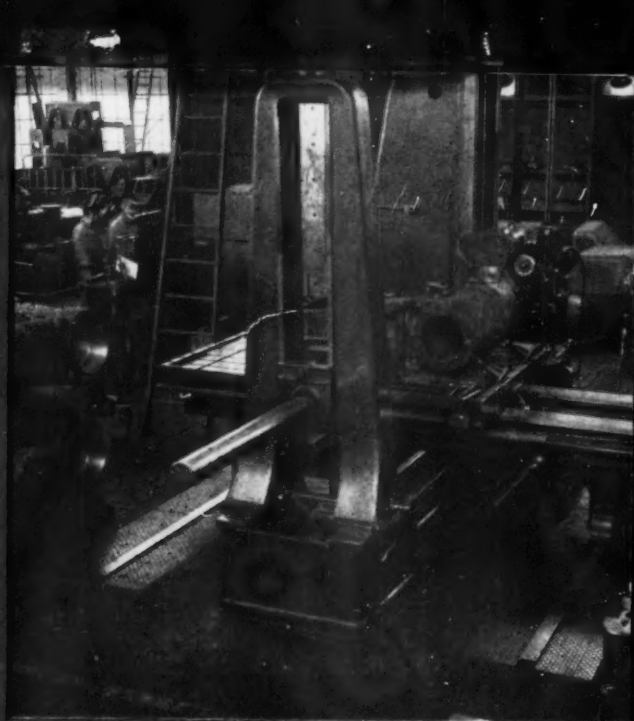


*Machine
and Tool*

BLUE BOOK

ESTABLISHED 1906



**Special Report on
GRINDING MACHINES**

JUNE 1953

**Dust Control in
Metalworking Shops**

**Metalworking Plant Squeezes
"Juice" from Scrap**

**Select Proper Steel for
Longer Die Life**

**Last Minute Washington News
"Know-How" Reference Sheets**

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...but

Experience Cannot be Copied

More than a quarter-century ago MARVEL invented and basically patented the MARVEL High-Speed-Edge Hack Saw Blade—the UNBREAKABLE blade that increased hack sawing efficiency many-fold.

Every MARVEL Hack Saw Blade ever sold has been of that basic welded high-speed-edge construction, with constant improvements from year to year, as EXPERIENCE augmented the "know-how" . . .

MARVEL is not "tied" to any single source of steel supply, and has always used the best high speed steels that became available from time to time as metallurgy progressed. When-as-and-if finer steels are developed—and are proven commercially practical for welded-edge hack saw blades—MARVEL will use them, regardless of cost or source . . .

There is only one genuine MARVEL High-Speed-Edge! All other "composite" or "welded-edge" hack saw blades are merely flattering attempts to imitate—without the "know-how" of MARVEL EXPERIENCE . . .

Insist upon *genuine* MARVEL High-Speed-Edge when buying hack saw blades—and be **SAFE**, for you can depend upon MARVEL. They have been "tested", "pre-tested", and "re-tested" by thousands of users for more than a quarter-century!



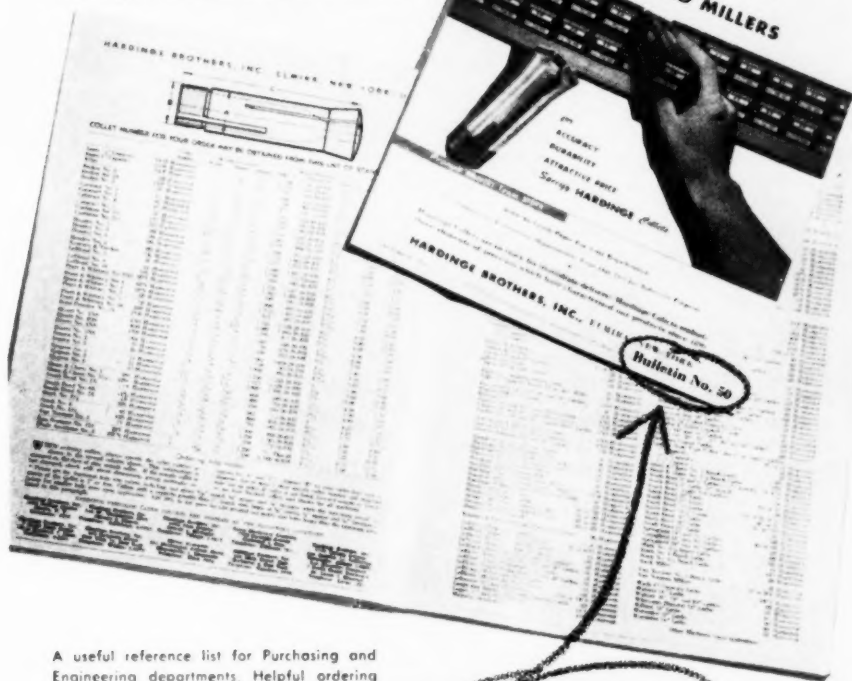
ARMSTRONG-BLUM MFG. CO. • 5700 Bloomingdale Ave. • Chicago 39, U. S. A.

HARDINGE
ELMIRA, N.Y.

Collets for Lathes and Milling Machines

for **ACCURACY**
DURABILITY
ATTRACTIVE PRICE
STOCK DELIVERY

Specify **HARDINGE Collets**



A useful reference list for Purchasing and Engineering departments. Helpful ordering information and up-to-date listing of popular style collets for all makes of lathes and millers. Shows major dimensions; maximum capacity for round, square and hexagon; collet adaptations for nose type chucks; stocking locations; how to order and prices.

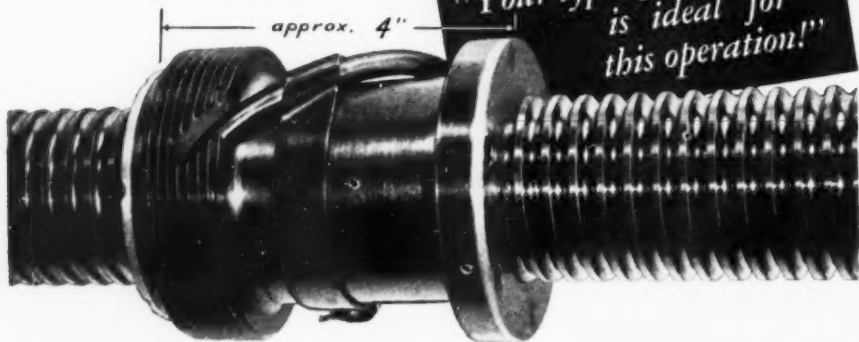
WRITE NOW!

If you do not have a
copy of Bulletin No. 50

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE

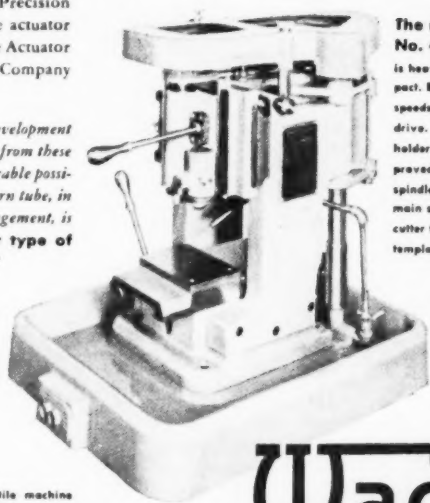
**the CLEVELAND PNEUMATIC
TOOL COMPANY says:**



*"Your type of equipment
is ideal for
this operation!"*

This ball bearing screw and nut is a special type of actuator for operating the landing flaps of airplanes. In pointing out the part that the Wade Precision Profiler played in the machining of these actuator screws, Mr. John A. Hope, Manager of the Actuator Division of the Cleveland Pneumatic Tool Company wrote as follows:

"These ball bearing screws were used in a development program on the Boeing B-29 flap system, and from these tests it was proved that our unit had considerable possibilities in this field . . . you will note the return tube, in order to get the most effective length of engagement, is recessed into the V-thread on the nut. Your type of equipment is ideal for this operation."



**The new Wade
No. 45**

is heavy, rugged, compact. Eight different speeds, powerful V-belt drive. Has new cutter holder celloids, with improved grip. A follower spindle parallel to the main spindle holds a cutter for producing templates from samples.

The Wade Precision Profiler is a versatile machine needed by every metal working shop, large or small. It performs precision recessing, slotting, milling, routing, and hand profiling operations faster, more efficiently, and more economically than by any other method. The working area on the table is 5 $\frac{1}{2}$ " x 3 $\frac{1}{2}$ ", and there is a removable fixture block of that size.

Wade
PROFILING MACHINE!

write for descriptive folder and prices

THE WADE TOOL CO.

WALTHAM 54 MASS. U.S.A.

MAKERS OF
PRECISION TOOLS FOR
AMERICAN INDUSTRY

51 RIVER STREET

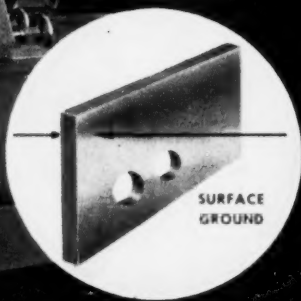
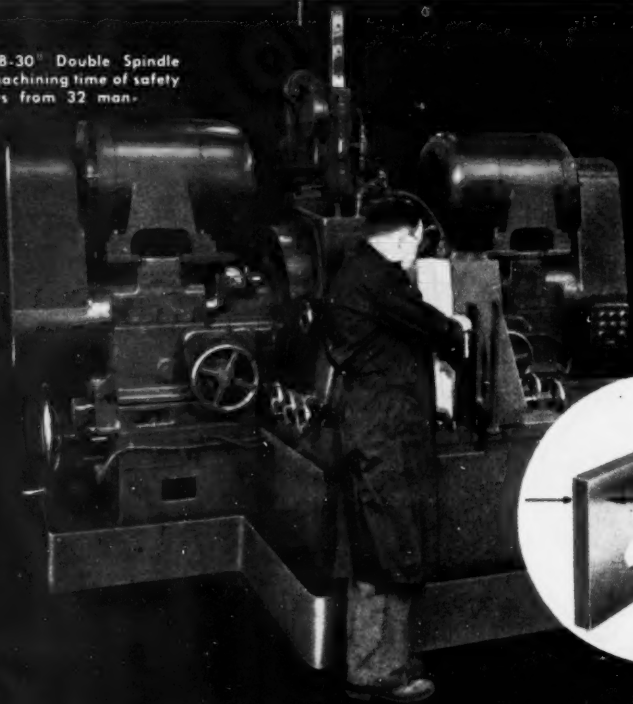
GARDNER GRINDING

Replaces Combined Milling-Surface Grinding

CUTS COST 75%!

TWO Surfaces Ground in **ONE** Operation

This Gardner 84B-30 Double Spindle Grinder reduced machining time of safety deposit box doors from 32 man-hours to 8 man-hours for daily production requirements.



JOB DATA

MACHINE: Gardner 84B-30 Double Spindle Grinder.

PRODUCTION AVERAGE: 4 to 6 pieces per minute per cut for doors up to 6" x 10"; maximum work size, 12" x 12".

TOLERANCE: .001" to .002" for parallelism. .005" for uniformity.

For help with your flat surfacing problems, send us your blueprints for production estimates and tooling suggestions.

GARDNER MACHINE COMPANY
436 Gardner St., Beloit, Wisconsin, U.S.A.

GARDNER
precision disc **Grinders**

ARMSTRONG



Quality
TOOLS



*Not a cost, but an investment
that pays year after year*

Buy **ARMSTRONG TOOL HOLDERS** and **TOOLS** for today's job and they will bring you added profits thru the years. With **ARMSTRONG TOOL HOLDERS** you will be permanently tooled up for whatever comes, for each is a multi-purpose tool that takes cutter-bits ground to many shapes. Each is an efficient tool, refined thru a half century of world wide use. Each has strength beyond any need, extra strength resulting from endless research and the most modern closely controlled manufacturing methods.

ARMSTRONG TOOL HOLDERS are inexpensive too, for they are produced in great numbers. They are instantly available because they are carried in stock by all leading supply houses in sizes and types for every operation on lathes, planers, slotters and shapers; for standard operations on turret lathes and screw machines. They are profitable in use because they permit the highest speeds and heaviest feeds, and "Save: All Forging, 70% Grinding and 90% High Speed Steel."

ARMSTRONG Lathe and Milling Machine Dogs are permanent tools, too. They are drop-forged from special open hearth steels, are heat treated to extreme stiffness and toughness. They have alloy steel screws hardened at the tip to prevent up-setting and have double life, for hubs are made oversize to permit re-lapping.

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ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5208 W. ARMSTRONG AVENUE • CHICAGO 30, ILL.

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EDITORIAL STAFF

Wm. F. Schleicher, editor
M. Bryan Baker, associate editor
E. McDaniel, associate editor
Arnold Kruckman, washington editor
Howard F. Smiley, director of research

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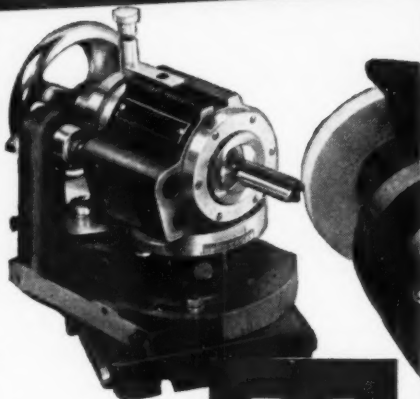
RELIEVES FORM TOOLS • RELIEVES CENTER DRILLS

RELIEVES TAPS • RELIEVES COUNTERBORES • RELIEVES SPHERICAL CUTTERS

RELIEVES PROFILE MILLS • RELIEVES REAMERS • RELIEVES STEP DRILLS

FOR MORE CUTS PER GRIND and BETTER CUTS — SHARPEN STRAIGHT and SPIRAL TOOLS WITH **D·S**

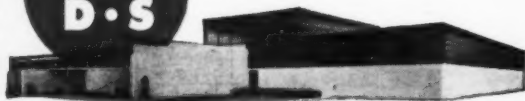
By actual user experience, radially relieved tools have outlasted tools with standard angular relief by as much as 5 times. They cut freer and better. D·S is readily set up and radial relief can be produced by any good grinder hand without special experience. Hundreds of these fixtures are now in use.



D·S RADIAL RELIEF GRINDER

NEW
HOME
OF
D·S

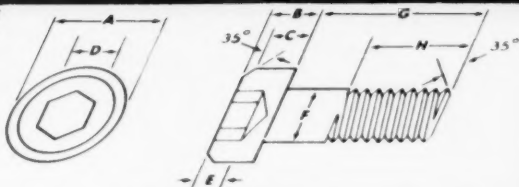
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D·S GRINDER DIVISION
Royal Oak Tool & Machine Co.
Stephenson Hyway • Royal Oak, Mich.

RELIEVES BORING BARS • RELIEVES HOLLOW MILLS

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MAC-IT PARTS COMPANY							
MATERIAL 316 V/V/D STEEL HELIX RUCHELL							
FINISH CHROMIUM PLATING ON STEEL 6-8 ZINC							
TOLERANCE IN LENGTH THE TOLERANCE IN LENGTH IS							
A	B	C	D	E	F	G	H
1/8	244	229	185	127	240	5	75

MAC-IT SCREW ENGINEERING

Mac-it fastener engineering is available for screw design to suit all types of applications.

SPECIAL SCREW PRODUCTS

Mac-it is geared for small or large runs of screws with special design or strength characteristics.

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Hundreds of distributors from coast to coast insure prompt attention to all screw requirements.

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1392 W. 3RD. STREET • CLEVELAND 13, OHIO
Manufactured by Mac-it Parts Co., Lancaster, Pa.





CINCIN

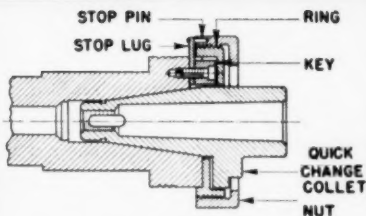
MACHINE and TOOL BLUE BOOK

..IN 20 SECONDS



He has a different cutter

ready to go!



Section through Quick Change Adapters and No. 50 Standard spindle nose.

In toolroom and job shops, cutter changing time is an expensive item. You can cut it down to a minimum with Cincinnati Quick Change Adapters, Collets and Arbors. They're easy to apply. A quarter turn of the collet nut, followed by tightening with a spanner wrench, and the collet is seated, ready to take a cut. This equipment makes it possible to perform a variety of operations . . . mill-

ing, drilling, boring, spot facing . . . in one setting of the work. And it requires an average of only 20 seconds to change from one cutter to a different one! Cincinnati Quick Change Equipment is available for milling machines having a No. 40 or 50 Standard milling machine spindle nose. Complete information will be found in publication No. M-985. Write for your copy today.

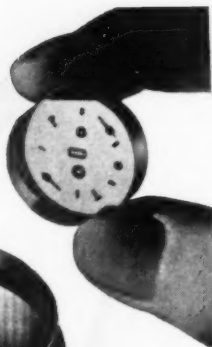
THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO

NATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING
MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES
OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

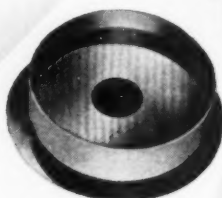
Tiny?

Yes! The No. 11 Blanchard Surface Grinder grinds these ladies' watch gears, pinions and ruiy bearings flat and parallel, and to a dimension tolerance of .0002".



Smooth?

Of course! The Blanchard No. 11 finished this refrigerator plate, seen through an optical flat, to 3 micro inches and flat within 1 light band (.0000118").



Accurate?

Sure . . . and easy, too! This Blanchard grinds 84" forged steel rings flat within .0002", parallel to .0002", dimension tolerance of $\pm .0005"$, and with surface finish of 4 micro inches.



Tremendous?

Yes . . . but fast! This 88" diameter cast-iron plate was ground on a No. 42-72-84 Blanchard in 3½ hrs., floor to floor. ¼" of stock—1520 cu. in.—380 lbs. was removed.

If you produce flat surfaces, your best bet is Blanchard Grinders—with Blanchard Wheels!

PUT IT ON THE

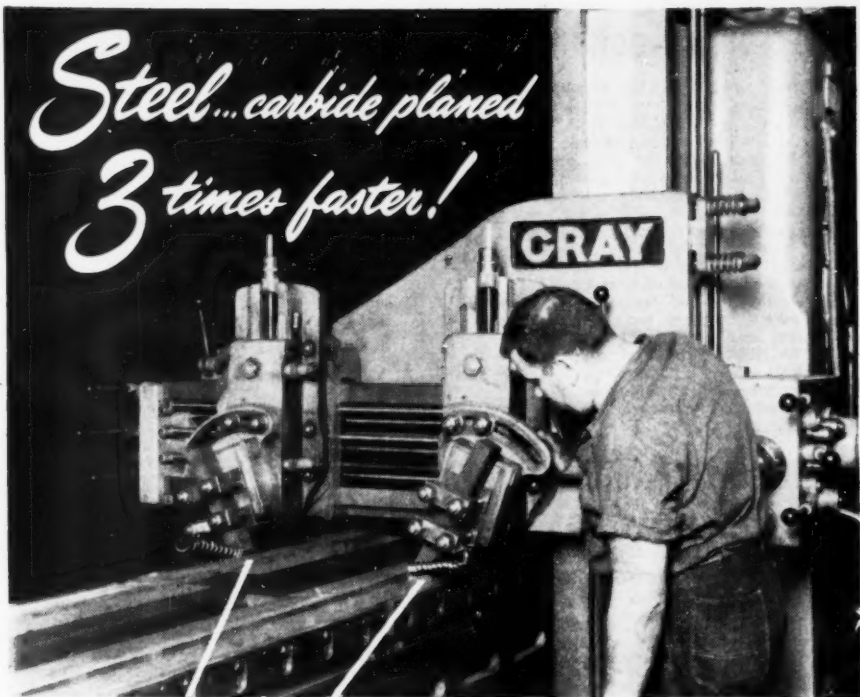


Send for your free copies of "Work Done on the Blanchard", fourth edition, and "Art of Blanchard Surface Grinding".

THE BLANCHARD MACHINE CO.

64 STATE ST., CAMBRIDGE 39, MASS., U. S. A.

*Steel...carbide planed
3 times faster!*



another cost saving performance record set
by the **GRAY PLANER CUB**

Former planing time of steel bars and gibs was cut to $\frac{1}{3}$ when this high speed GRAY PLANER CUB was put into action at a leading Midwestern metal fabricating plant.

This is accomplished by the Cub's high speed, greater power and tremendous rigidity—all essential to heavy duty carbide steel planing.

Proof of outstanding performance is the fact that this company has two more Cubs on order. Built in 24" — 30" — 36" sizes. Write for Bulletin 55.

the job: planing hi-carbon, hi-chrome steel bars

cut speed 160' per min. • return speed 300' per min. • two heads • depth of cut $\frac{3}{32}$ " • feed .040

The G.A. **GRAY** *Company*

planers • milling planers
planer type milling machines
horizontal boring machines

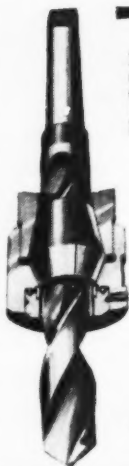
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CINCINNATI 7, OHIO, U. S. A.

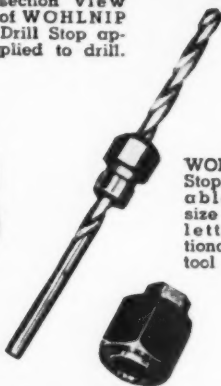
SOLD IN CANADA BY UPTON, BRADEN AND JAMES, LTD. • SOLD IN LATIN AMERICA BY MACHINE AFFILIATES

DRILL STOP HOLE DEPTH CONTROL

Now you can be certain of positive control of hole depth with the WOHLNIP Drill Stop . . . which is non-rotating. Will not mar, mark or damage the face of the work, fixture or bushing. Completely automatic, the WOHLNIP Drill Stop, reduces human errors, simplifies "difficult" jobs, lowers machining costs, increases production and eliminates rejects! Used for drilling, center drilling, counter boring, counter sinking, reaming and end milling. The WOHLNIP Drill Stop is used on drill presses, radial drills, lathes and turret lathes. Write today for illustrated folder and prices.



Left: Cross section view of WOHLNIP Drill Stop applied to drill.



WOHLNIP Drill Stops are available for any size of number, letter or fractional drill and tool shanks.

WOHLNIP

A PRODUCTION PROVED PRODUCT

Built for many years of dependable service, the WOHLNIP Drill Extractor is furnished complete to handle all standard broken drills from $\frac{1}{8}$ " to $\frac{1}{2}$ " diameter OR A TOTAL OF 168 DRILLS! Special sizes can be made to order.

At right is a cross section view of the WOHLNIP Drill Extractor at work. First step is to remove and blow out the chips from the hole. Second: insert the correct size Extractor wires. Third: Center guide is pushed down on top of broken drill. Fourth: Tighten set screw. Fifth: Hold wrench in position and apply pressure until drill is loose. Then, simply pull out. That's all there is to it!



Patent Pending



DRILL EXTRACTOR

"Paid For Itself on One Job"

. . . writes another satisfied customer! In 10 seconds, yes, that's correct . . . 10 seconds the WOHLNIP Drill Extractor is ready for work. A broken drill, "frozen" tight in a hole, is easily removed within a few minutes by inexperienced operators. It is not necessary to remove the set-up . . . nor do you require special machines or tools. Everything you need is in the handy kit pictured below. You can reduce costly down time, salvage valuable parts . . . with the WOHLNIP Drill Extractor. Send now for full information.

Boxed set of 6 different size extractors including wrenches.



Your shop needs WOHLNIP's Drill Stops and Drill Extractors. Send for complete details today.

EXCLUSIVE DISTRIBUTORS WANTED

WOHLNIP ENGINEERING COMPANY
589 CENTRAL AVE. • EAST ORANGE, NEW JERSEY

How would you like to see your costs going down? (FOR A CHANGE)

WITH spiraling costs the headaches they are today, it's especially encouraging to see examples of costs going down. And that's exactly what happened at Walter Kidde & Company, Inc. of Belleville, N. J. This manufacturer puts the skids under constantly rising costs by installing six new Warner & Swasey 1-AC Single Spindle Automatic Chucking Machines.

These new machines now handle

chucking and turning operations on nine different parts . . . all formerly done with hand-operated machines—at less than $\frac{1}{3}$ of the previous cost.

But that's not all! The 1-AC's helped solve a pressing manpower problem, because one operator can now handle two or more machines.

Result? The Kidde Company has added nine more of these cost-cutting machines—giving them a total of fifteen 1-AC's!



Warner & Swasey 1-AC Single Spindle Automatic Chucking Machines in use at Walter Kidde & Company, Inc., a leading manufacturer of fire extinguishing apparatus, textile machinery, aircraft and marine equipment.

**WARNER
&
SWASEY**
Cleveland
PRECISION
MACHINERY
SINCE 1880

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

Announcing

THE

NEW

**VAN
NORMAN**

DIVERSIMATIC
**CENTERLESS
GRINDING
MACHINE**

...another addition

The new Van Norman *Diversimatic* centerless grinding machine incorporates many outstanding, exclusive advantages that result in more work output per operator, per work shift.

This rugged, precision-built, heavy-duty centerless grinder enables you to perform three centerless grinding jobs with practically no change-over time. It's a standard centerless grinder for ordinary throughfeed work... a standard grinder for lathe jobs... and equipped with a Crush Forming attachment, it turns grinds and does profile work.

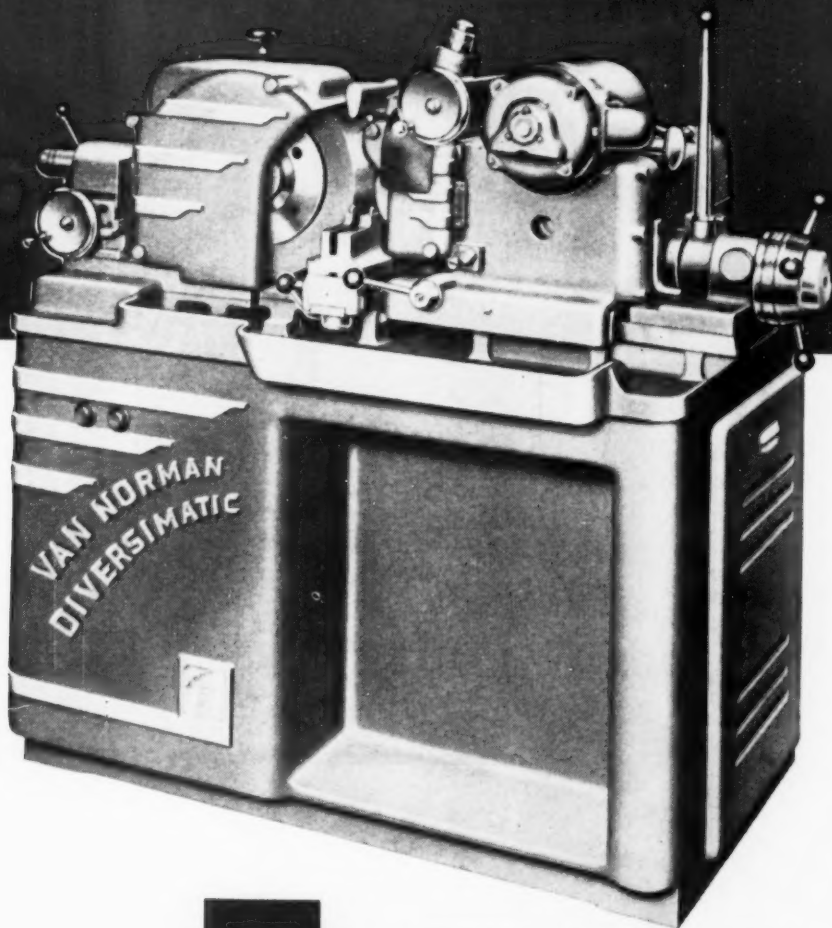
COMPARE THESE OUTSTANDING VAN NORMAN DIVERSIMATIC FEATURES

- Special, easily removable grinding wheel, spindle quill, with combined double-row super precision ball and roller bearings, sealed and lubricated for life assure trouble-free operation
- Spindle requires no warm-up period
- Combination straight and contour grinding wheel dresser
- Straight screw-type regulating wheel dresser
- Grinding wheel diamond constantly flushed from below with coolant during wheel dressing
- Infinitely variable ¼ h.p. regulating wheel drive, 30 to 300 r.p.m.
- Large 1½ inch 4 thd. Acme Infeed Screw with full length split type nut to compensate for wear
- Work-Rest adjustable for position; may be fixed across the ways or made to feed in and out with the regulating wheel

Get the full facts on the Van Norman *Diversimatic* Centerless Grinder. See for yourself how this versatile grinder can cut your grinding costs on small shafts, formed shapes, parts of two or more diameters or special contours.

* Van Norman *Diversimatic* acquired from Diversified Metal Products Co.

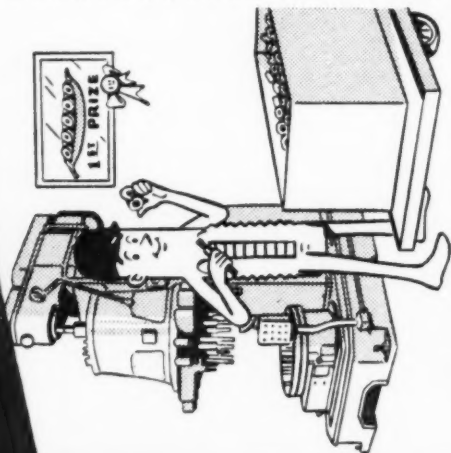
to Van Norman's expanding Grinder Line



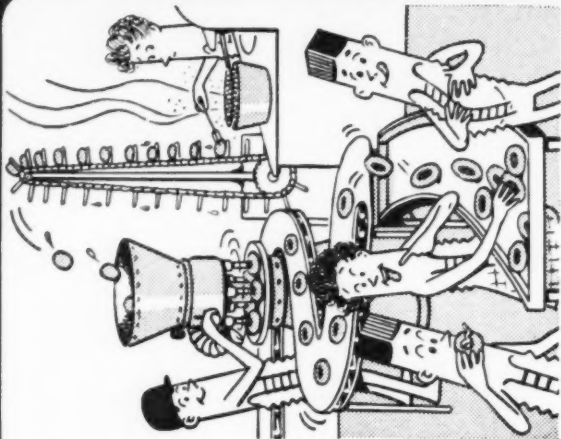
VAN NORMAN COMPANY

SPRINGFIELD 7, MASSACHUSETTS, U. S. A.

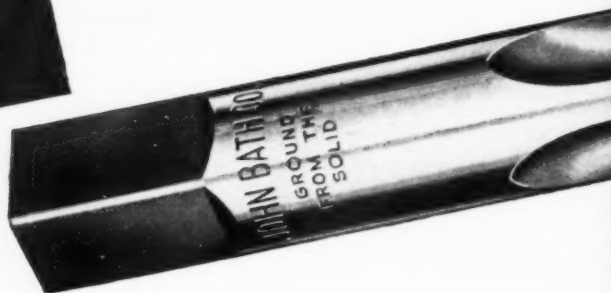
TAP-ODDITIES



Bath Taps are "tops" on long runs,
Pete sez — "they've got the guts".
When parts look like "peas in a pod" —
Believe me — it's the NUTS!



At home — Pete rigged this gadget
For all his "dolls and guys".
They'll fight no more for do-nuts
Since the holes are tapped to size.



A Bath Tap produced 160,000 malleable iron union ring nuts at a surface speed of 120 feet per minute.

That's the kind of high speed tapping production that puts you "in the dough".

On long runs, uniform work depends upon the uniformity of the taps themselves.

Bath Tap manufacture is controlled . . . right from the start, when the blanks are scientifically hardened to an exact, uniform degree before thread grinding.

Special equipment and precision instruments guard production to the final operation . . . turning out these high speed taps like "peas in a pod".

Whether you require stock or custom built taps . . . you can depend on **BATH TAPS** for **BETTER THREADS**. And . . . if you have a problem, a Bath representative will call, or write direct for engineering assistance.

INSIST ON BATH TAPS
— PROFIT BY THEIR
PLUS—PERFORMANCE



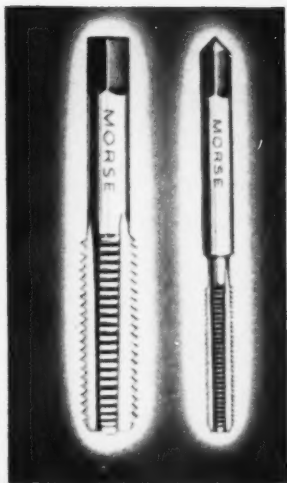
PLUG AND RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

JOHN BATH CO. INCORPORATED
14 Grafton St., Worcester, Mass.

**"We never knew
what Special-Purpose Taps
could do... 'til we
got these NEW
MORSE TAPS!"**

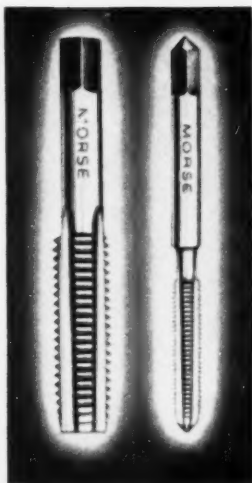


MORSE



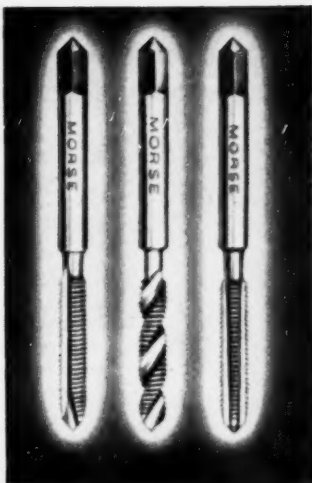
For Brass or Cast Iron

For use in these and other materials with *brittle-chip* characteristics . . . in hand, machine-screw, and taper-pipe styles. Made with radial face (0 degrees rake — see drawing at right below) and surface-treated to resist abrasion and loading. High-speed steel with commercial ground threads only, except for pipe taps (also furnished with cut threads.)



For Aluminum or Stainless Steel

For use in these and other materials with *stringy-chip* characteristics . . . in hand, machine-screw, and taper-pipe styles. Made with a 15-degree hook (see center drawing at right below) and commercial ground threads, in high-speed steel only.



Oversize Machine-Screw Taps

For use in materials like plastics or zinc alloys, where difficult to maintain proper tapped-hole size . . . because of the material's abrasive properties or its tendency to shrink, after tapping. Made in certain sizes only . . . in straight-flute . . . spiral point . . . and spiral flute styles. Regularly furnished .002" over standard commercial ground-thread limits. Surface-treated to resist abrasion.

HERE'S THE BIGGEST TAP NEWS IN YEARS . . . and as usual it comes from Morse. These new Special-Purpose Taps . . . set new standards of performance and long life. Get the whole story on this new Morse line *direct and in person* . . . from your experienced Morse-Franchised Distributor, who is always at your service. He has an important new free booklet for you . . . giving complete details on these new Morse Special-Purpose Taps, and full information on the new Unified Threads.

MORSE TWIST DRILL & MACHINE COMPANY

NEW BEDFORD, MASSACHUSETTS

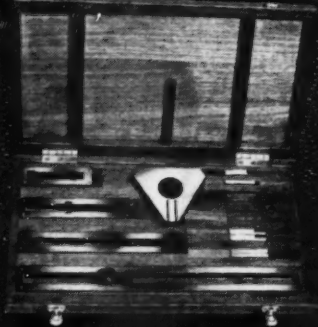
(Division of VAN NORMAN CO.)

Warehouses in New York, Chicago, Detroit, Houston, San Francisco

Cutting Tools



Standard **Webber** Accessories for Dimensions under 12"



WEBBER Standard Accessories are designed for use with standard Webber Gage Blocks and are recommended for measurement under 12". Gage block holders, jaws, center point, scriber and base can be combined into a variety of small gages for precision layout and inspection.

Heavy Duty Blocks and Accessories for Dimensions over 12"



No workpiece too large, infinite range. Patented clamps, jaws, center point, scriber and base offer wide gaging application. Patented eccentric clamp squeezes blocks in opposite directions thus maintaining $\pm .000005"$ over entire buildup.



Webber
GAGE BLOCKS
and ACCESSORIES

WEBBER GAGE COMPANY

12905 Triskett Road • Cleveland 11, Ohio

Largest exclusive manufacturer of
precision gage blocks



HAND TAPS

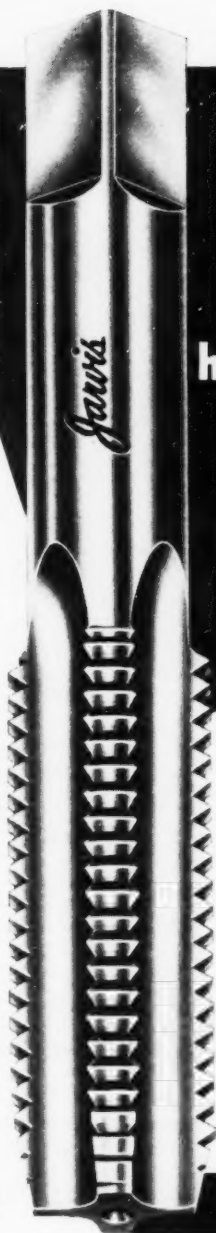
NUT TAPS

PULLEY TAPS

JARVIS POWER TOOLS

include:

TAPPING ATTACHMENTS • TAPS
ROTARY FILES
FLEXIBLE SHAFTS and
MACHINES • TUNGSTEN CARBIDE
REAMERS and MILLS • DRILLS
BORING BITS



Jarvis TAPS

AN INDUSTRIAL TAP FOR INDUSTRIAL USERS

have "Custom Made"

Cutting Edges at
NO EXTRA CHARGE

"Custom Made" means just that! Accurate indexing and precision machine grinding of flute and spiral points on Jarvis Taps produce a tool in which ALL the cutting edges do their share of the work. Our highly accurate fluting process makes it possible for us to control for your PARTICULAR NEEDS the amount of hook ground in the flutes. Specify Jarvis, and you'll always have "Custom Made" Taps designed to do a specific job superbly well.

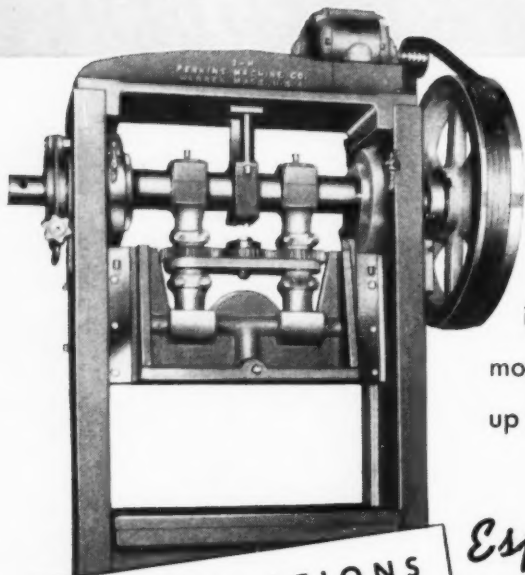
Send for complete Tap Catalog now—also name of your nearest Jarvis representative.



THE CHARLES L. JARVIS CO.
MIDDLETOWN IN CONNECTICUT

PERKINS No. 2-H

Double Crank Flywheel Press



A standard double crank, straight side press at a surprisingly low price. This model press built in sizes up to 200 tons capacity.

SPECIFICATIONS

Bed area 18 x 30"
 Capacity 20 tons
 Wheel 28" diam. x 350 lbs.
 Strokes.....as required by customer
 Distance, bed to ways.....14 to 16"
 Speeds 70 to 200 rpm

*Especially
 suited for
 dies requiring
 large bed
 areas*



PRESSES BUILT TO SPECIAL SPECIFICATIONS

PERKINS MACHINE CO.
WARREN, MASSACHUSETTS

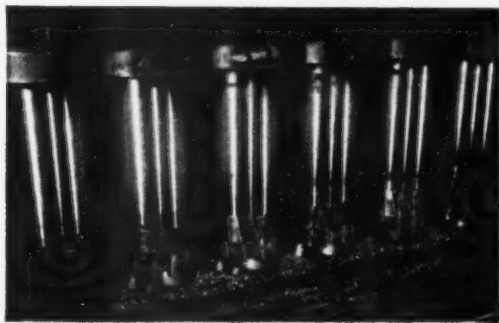
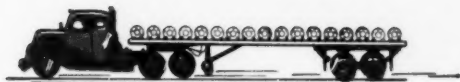
OUNCES
OF



WESSONMETAL

CEMENTED CARBIDE!

TONS OF PRODUCTION!



ACTUAL JOB

Farm Implement Mfg. Co.

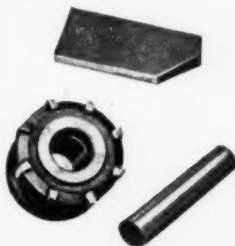
Machine.....Ingersoll Boring Mill—6 spindle
Part.....Cylinder block
Operation.....Rough cylinder bore
Tools.....3 R.H. and 3 L.H. Wesson Fine
Pitch Cutters—3.480 dia.—
12 Wessonmetal Solid G1 Blades
Speed.....148 S.F.M.
Stock Removal...3/16"
Feed.....10" per min.—.063 per revolution
Length of Cut...8 7/8"

OVER 300% DOLLAR SAVINGS PER TOOL

OLD METHOD		NEW WESSON METHOD	
Pieces per Grind.....	836	Pieces per Grind.....	3140
Cost of Tool.....	\$49.48	Cost of Tool.....	\$172.80
Grinding Cost per sharpening.....	\$11.70	Grinding Cost per Sharpening.....	\$8.78
Tool Cost per 100 Pieces..	\$2.588	Tool Cost per 100 Pieces..	\$0.442

On only one machine with Wesson Tools Savings of over \$900 per year

HOW IS YOUR PRODUCTION SCORE CARD!



Write today for folder
on Wesson's
educational, full color,
sound movie—
"This Carbide Age."

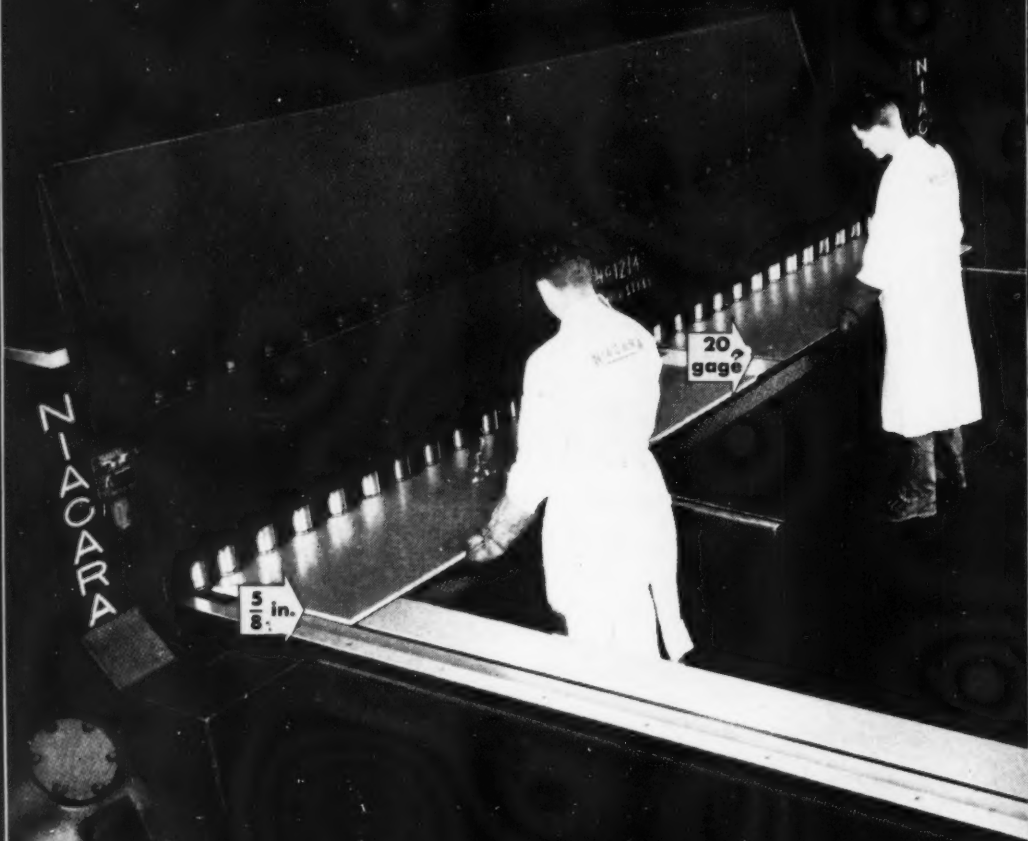
WESSONMETAL
Cemented Carbide

WESSON METAL CORPORATION

LEXINGTON, KENTUCKY

Affiliated with WESSON COMPANY, Detroit, Mich.

CUTTING 20 GAGE and $\frac{5}{8}$ " PLATE SIDE-BY-SIDE AT ONE STROKE



Photograph shows operators cutting $\frac{5}{8}$ " plate and 20 gage sheet steel simultaneously on NIAGARA Power Squaring Shear. No change in knife adjustment is necessary.

The ability of Niagara Power Squaring Shears to cut thick and thin plate both at the same time with the same knife setting is a dramatic demonstration. Visitors at our plant can see this done every day. There is no necessity for tinkering with the knife adjustment.

*Demonstrates The Sound
Engineering Design of*

NIAGARA

POWER SQUARING SHEARS

● There is no compromise with sound, proven engineering when it comes to NIAGARA shear design and construction.

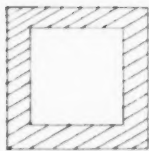
Accurate cutting depends primarily on rigidity of the shear's components.

For bed, crosshead and holddown NIAGARA uses CLOSED BOX SECTIONS to resist with minimum deflection the horizontal, vertical and diagonal or torsional loads to which every shear is subjected.

NO OTHER SECTION WILL DO THIS JOB AS EFFICIENTLY.

Angle or channel shaped sections have long since been abandoned for use on NIAGARA Power Shears.

The economy of quality is remembered long after price is forgotten.



BED, CROSSHEAD & HOLDDOWN DESIGN

NIAGARA MACHINE AND TOOL WORKS, BUFFALO 11, NEW YORK
DISTRICT OFFICES: DETROIT, CLEVELAND, NEW YORK

WERNER MILLERS

No. 2 Vertical, Universal, Plain

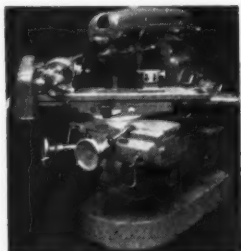
Table sizes: 43" x 12"

Spindle speeds: 80 rpm to 1500 rpm

Table feeds: 1/2" per min. to 14" per min.

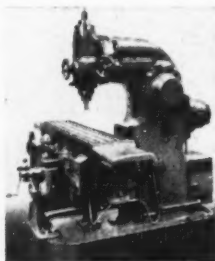
Horsepower: 7.5

Weight 4800 lbs.



NO. 2 UNIVERSAL

NO. 3 VERTICAL



No. 3 Vertical, Universal, Plain

Table sizes: 63" x 14 1/4"

Spindle speeds: 28 rpm to 1440 rpm Vert.

24 rpm to 1200 rpm Plain & Univ.

Table feeds: 1/2" per min. to 23" per min.

Horsepower: 11.5

Weight 8800 lbs.

No. 4 Vertical, Universal, Plain

Table sizes: 71" x 16"

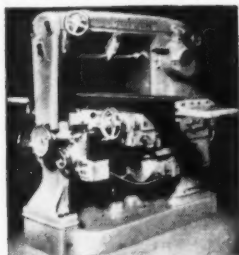
Spindle speeds: 28 rpm to 1440 rpm Vert.

24 rpm to 1200 rpm Plain & Univ.

Table Feeds: 1/2" per min. to 23" per min.

Horsepower: 19

Weight: 11,250 lbs.



NO. 4 PLAIN

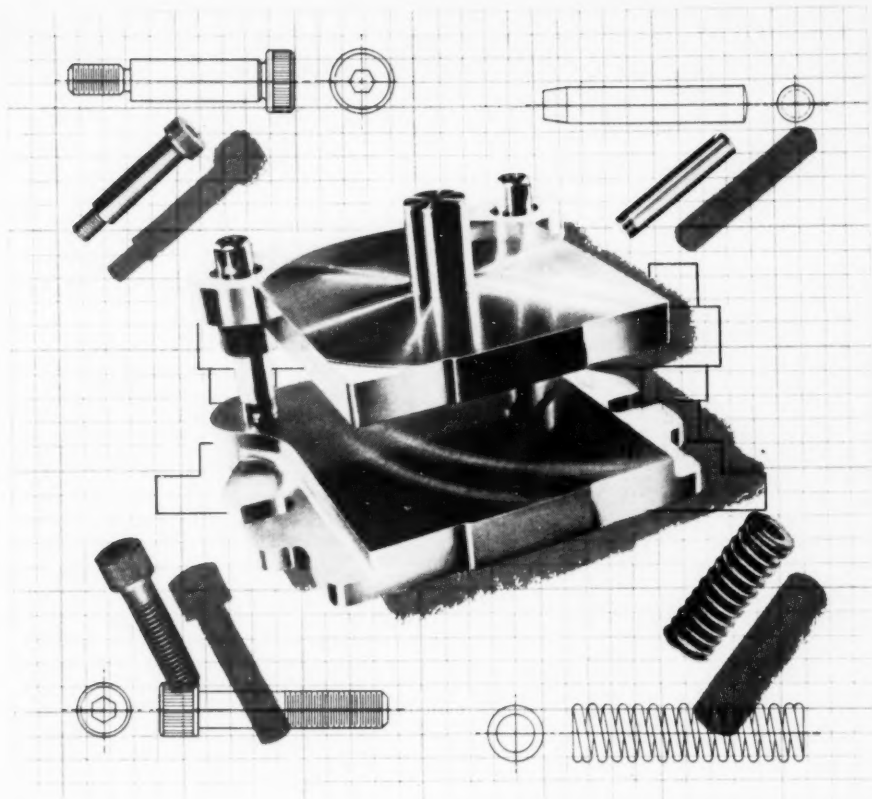
ALL AVAILABLE FOR IMMEDIATE DELIVERY FROM NEW YORK STOCK

For further information and fully illustrated specification brochure,
Write, Wire, Phone



MARAC Machinery Corp.

1819 BROADWAY, NEW YORK 23 • CI 7-2048



THERE'S A DANLY STANDARD TO MEET YOUR DIEMAKING SPECIFICATIONS

In nearly every instance, Danly can meet your diemaking specifications with *standard* Danly Die Sets and *standard* Danly Die-makers' Supplies. Eliminate delay between design and production... you can be sure of prompt delivery from completely stocked Danly branch assembly plants located in major tool-making centers.

More than 30 years' experience in supplying diemakers' needs has established Danly's reputation for design excellence and dependable accuracy. Diemakers everywhere *prefer* Danly!

Plan now for faster tooling and longer production runs at less cost... with Danly Die Sets and Danly Die-makers' Supplies.

Call Your Local Danly Branch Today!

*CHICAGO 50... 2100 S. Laramie Ave.

*CLEVELAND 14... 1550 East 33rd St.

*DAYTON 7... 3196 Delphos Ave.

*DETROIT 16... 1549 Temple Ave.

*GRAND RAPIDS

113 Michigan St., N.W.

INDIANAPOLIS 4... 5 West 10th St.

*LONG ISLAND CITY... 47-28 37th St.

*LOS ANGELES 54... Ducommun Metals

& Supply Co., 4890 South Alameda

MILWAUKEE 2... 111 E. Wisconsin Ave.

*PHILADELPHIA 40

511 W. Courtland St.

*ROCHESTER 6... 33 Rutter St.

*Indicates complete stock

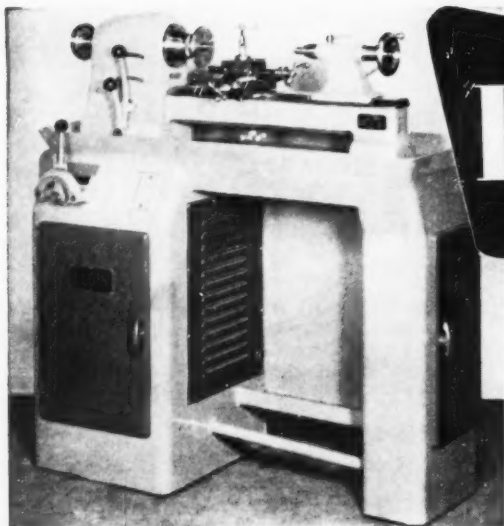


DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue

Chicago 50, Illinois

DIE SETS AND DIEMAKERS' SUPPLIES



ELGIN

LATHES

MODEL EPL-5C STEEL PEDESTAL BASE

Knee Hole Bench affords operator utmost comfort and convenience directly in front of work. Variable speed drive provides stepless speeds 120 to 3780 R. P. M. Built-in cabinets of ample size for collets and other tools. Collet capacity 1". Nine-inch swing.

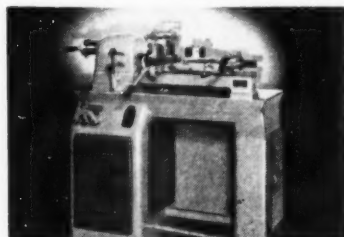
TOOL ROOM PRECISION WITH PRODUCTION SPEED

You can depend on it when you use Elgin Lathes for smaller types of work that must be finished to close tolerances. They are designed and built with sturdiness to insure precision operation at production speeds.

Elgin Lathes are available in a variety of designs for special applications and with different bench types.

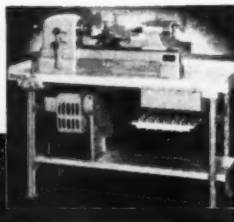
ELGIN LATHE MODEL EL, WITH LAMINATED WOOD BENCH

Designed specially for Tool Room work with extra bench space. Extra strong and rigid. Bench top is 2 1/4" laminated seasoned hard maple and thoroughly re-inforced. Lathe specifications, same as shown above.



HAND SCREW MACHINE

With steel pedestal base. Spindle speeds 120 to 3780 R. P. M. with Variable Speed Drive. Any speed quickly available without stopping spindle. Directly reversible. Collet capacity 1". Nine-inch swing. Two-speed motor, 3/4-3/8 H. P. Coolant system mounted in back and outside for convenience.



ELGIN TOOL WORKS, INC.

1772 BERTEAU AVENUE

CHICAGO 13, ILLINOIS

Get **EXTREME ACCURACY—**
use
OLIVER ACE

**Universal Tool and
Cutter Grinders**



Direct Reading for Clearance

- Reduces Fatigue
- Eases Operators' Jobs



Grinding cutters quickly and accurately is a must in the modern toolroom. Oliver Ace grinders have been turning out precision-sharp cutters in toolrooms everywhere for years, gaining a solid reputation for their ease, speed and simplicity of operation. The Oliver Ace is easy on the operator too, since it requires no computation yet handles a wide range of cutter grinding. It's faster on most grinding operations — the set-up is simple — the direct reading for clearance reduces fatigue, eases operators' jobs (no stoop . . . no squat . . . no squint).

Oliver Ace Cutter Grinders have proved their dependability. They're soundly engineered, efficient, and economical to operate. They easily grind the most difficult cutters — giving guaranteed accuracy — excelling on high speed and Tungsten-Carbide work.

Priced to meet your budget, the ACE excels for grinding face mills up to 15" — also, slab mills • slitting saws • dovetail cutters • angular cutters • double angle cutters • Fellows helical cutters • reamers • taper reamers • production gashing.

See our catalog in Sweet's Directory

2 MODELS: Standard and Heavy Duty (illustrated)
Write Today for Complete Data

OLIVER INSTRUMENT CO.

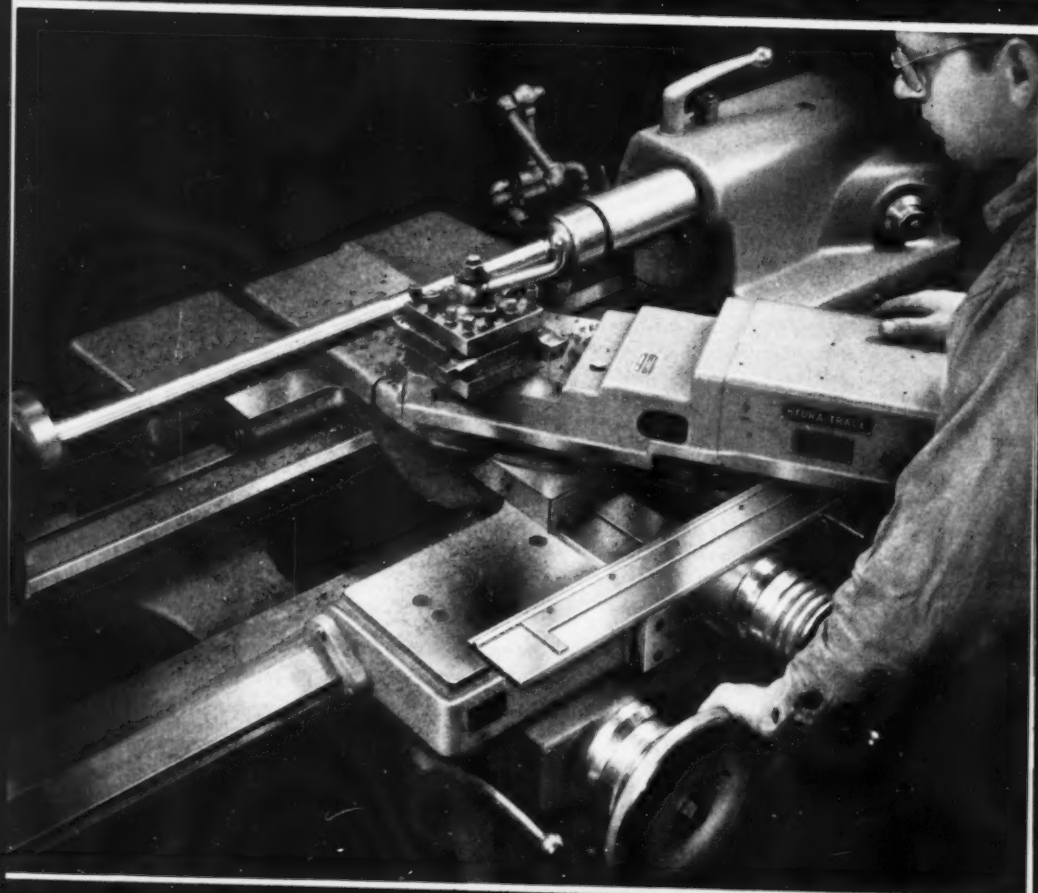
1408 E. MAUMEE • ADRIAN, MICHIGAN

**MACHINE TOOLS
by OLIVER include:**

AUTOMATIC DRILL GRINDERS
 TOOL & CUTTER GRINDERS
 DRILL-POINT THINNERS
 TEMPLATE TOOL GRINDERS
 FACE MILL GRINDERS
 DIE MAKING MACHINES

NOW SCULLY-JONES TURNS

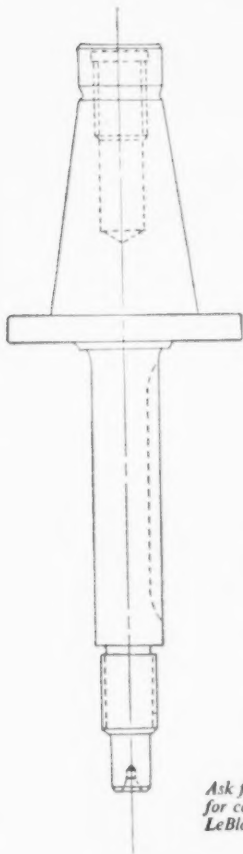
four arbors instead of 3...



Hydra-Trace (Trade Mark Registered)
U.S. Pat. 3,071,171 is Leffland's heavy-duty
hydraulic tracing attachment. Can be
mounted in place of the compound rest
on practically all lathe and other tool
machines.

same time, same lathe...

plus "Hydra-trace"



When defense needs mushroomed demand for production equipment, Scully-Jones & Co. of Chicago found itself jammed with orders for milling machine arbors (they make more arbors than anyone else). Acting on advice from engineers at LeBlond's Chicago Office, Scully-Jones added Hydra-Trace to their LeBlond 16" RT Engine Lathe. Now they turn out four arbors in the time formerly needed to produce three—same lathe, plus Hydra-Trace.

Besides boosting output, this template-controlled hydraulic tracer saves 45% on set-up time, gives uniform precision without the need of a highly-skilled operator.

Stepless form-turning, contour facing, and turning step shafts are all in a day's work for Hydra-Trace. Fits all LeBlond Engine Lathes built since 1935, can be mounted easily in a matter of minutes. Templates are flat, compact, suitable for both rough and finish turning. They can be produced readily in your own plant, stored in limited space.

When turning requirements call for increased output—with present machines or with new equipment—you'll find just what you need in LeBlond's complete line of lathes and lathe attachments.

Call your nearby LeBlond Distributor or write—

*Ask for Bulletin HT2E
for complete details on
LeBlond Hydra-Trace.*

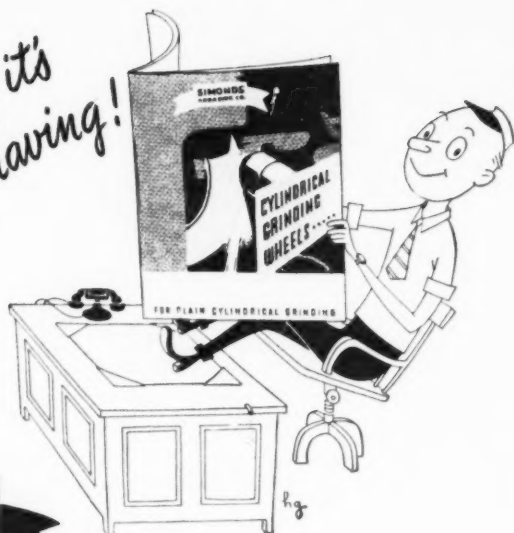
turned faster by



THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • FOR MORE THAN 65 YEARS

*For better grinding it's
well worth having!*



SIMONDS
ABRASIVE CO.

Grinding Wheels

It's Simonds Abrasive Company bulletin ESA 191 "Cylindrical Grinding Wheels" with recommended specifications—plus facts about feeds, speeds and wheel sizes. It's part of a *complete* library on Simonds products including wheels for rough grinding, finishing, cutting off, sharpening . . . abrasive polishing grain . . . mounted wheels and points . . . surfacing segments . . . everything *you* need for productive, economical grinding, factually described and supplemented with helpful hints. Write for ESA 191 . . . or for information on Simonds wheels for other grinding jobs. We'll also send name of your Simonds distributor.



SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON

DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

SENTRY

*The Better Way
To Heat Treat High Speed Steel!*

"ALWAYS ON DUTY"



SENTRY MODEL YP
Vertical, model
for long, slender
drills, reamers,
broaches, etc.

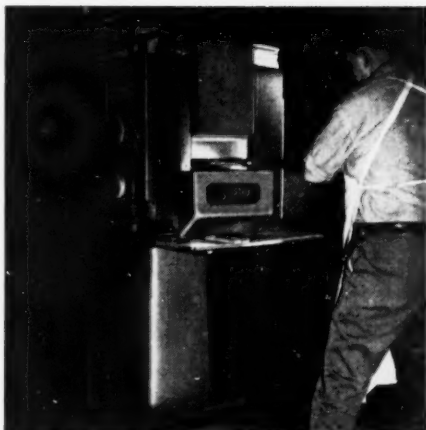
SENTRY MODEL ZY
For small tools,
cutters of moly,
tungsten and co-
balt high speed
steels.



"Entirely Satisfactory In Every Use!"

**That's SENTRY's Record at
L. C. Smith & Corona Typewriters, Inc.**

C. D. Corwin, Works Manager of the Groton, New York plant of L. C. Smith & Corona Typewriters, Inc., has this to say about the Sentry Electric Furnace and Diamond Block in regular use in his heat treating department: "We use our Sentry equipment for hardening high speed steel tools of various sizes. For several years it has given us entire satisfaction."



Request Catalog S-2



Sentry No. 3 Model Y Furnace at the Groton, New York plant of L. C. Smith & Corona Typewriters, Inc.



THE SENTRY COMPANY

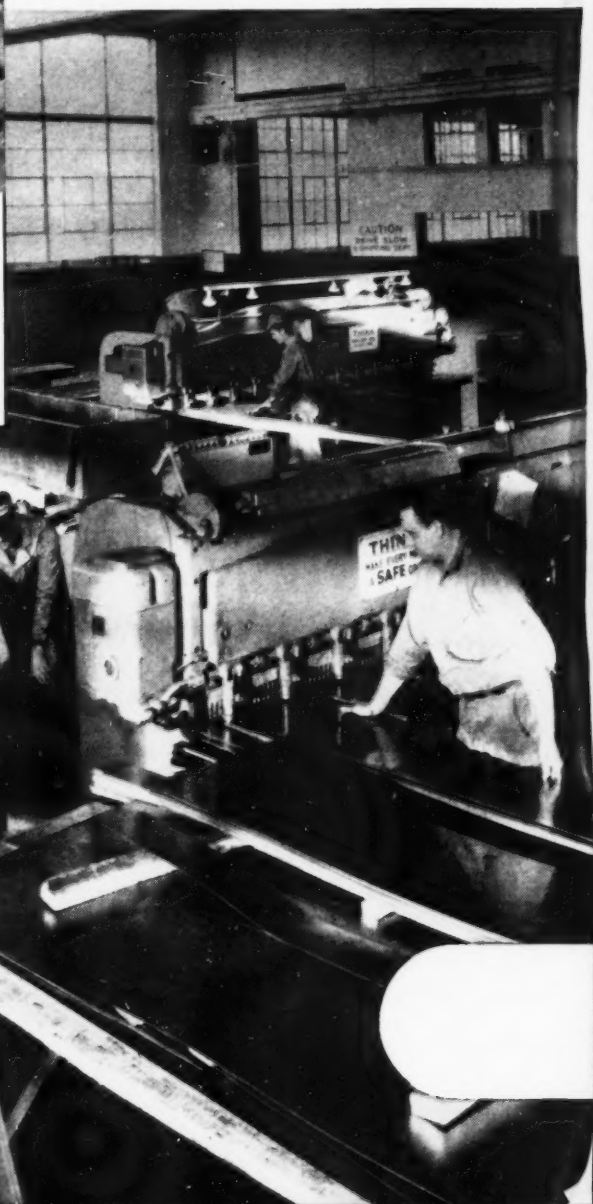
INDUSTRIAL ELECTRIC FURNACES AND EQUIPMENT FOR HEAT TREATMENT OF METALS

ACCURACY is

TONS OF PRESSURE

$\frac{3}{8}$ " 10 Gauge Zero

Micrometer accuracy starts with Cincinnati Hydraulic Holddowns. They exert tons of pressure and automatically hold all thicknesses of work securely.



necessary

...AND THE SPEED

AND VERSATILITY OF

CINCINNATI SHEARS

IS NEEDED, TOO...

Here at The W. J. Holliday Company, Inc., The Department Store of Steel—these busy Cincinnati Shears operating continuously, shear accurate blanks to customer size.

They handle cold finished, or pickled and oiled sheets up to 10 gauge and hot rolled sheets up to $\frac{1}{4}$ ". Both management and operators are enthusiastic about their Cincinnati Shears.

Write for Shear Catalog S-6.

*Photos courtesy The W. J. Holliday Company, Inc.,
Indianapolis, Indiana*

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

SHAPERS • SHEARS • BRAKES



on your nut setting operations...



Why
use two?

when
one will do!

One-piece, precision-built Apex SN Nut Setters offer several advantages not found in two-piece socket-extension combinations. Power is applied direct from gun to work . . . full torque is developed . . . operation is faster, safer—and easier on tools and on tool operators. There are no movable parts, joints or locking devices to cause vibration, backlash and excessive loss of torque.

Apex SN Nut Setters are available with

the following hex shank drives— $\frac{1}{4}$ " (standard and bolt-clearance type); $\frac{7}{16}$ ", $\frac{5}{8}$ " and $\frac{3}{4}$ " (standard type). Broached openings, Hexagon: $\frac{3}{16}$ " to $1\frac{1}{2}$ "; Square: $\frac{1}{4}$ " to $\frac{7}{8}$ ". If your power tools take a hex shank, you can use Apex SN Nut Setters on your work, and save time, money and manpower—now!

CATALOG 29 contains complete information, specifications and illustrations of over 5,000 Apex impact sockets, extensions, adapters, universal joints and other production tools. Write, on your company letterhead please, for your copy.

**APEX
TOOLS**

sockets, extensions, adapters

THE APEX MACHINE & TOOL COMPANY

1028 S. Patterson Blvd., Dayton 2, Ohio

Power Bits • Insert Bits and Bit Holders, for Phillips, Fearson (Reed & Prince), Slotted, Clutch Head and Socket Head Screws • Hand Drivers for Phillips, Fearson and Clutch Head Screws • Two-Piece Drivers for Hex Head Screws • Sockets, Extensions, Adapters and Nut Setters • Universal Sockets, Extension Wrenches and Adapters • Aircraft and Industrial Universal Joints • Self-Releasing and Adjustable Stud Setters • Safety Friction Tapping Chucks • Vertical Float Tapping Chucks.



AT WENDT-SONIS



A LINDBERG INDUCTION HEATING UNIT UPS TOOL TIP BRAZING 135%... REPLACES TWO UNITS

Production brazing of carbide tip tools has soared from 270 to more than 600 an hour since Wendt-Sonis, Hannibal, Mo., tool manufacturer, installed a Lindberg induction heating unit.

Two operators, fluxing parts and putting brazing metal and carbide tool tips in place, load the assemblies on a conveyor belt that passes a continuous stream of work through a specially designed, long hair-pin

type heating coil.

Production, formerly through two smaller units, totalled only 135 tools per hour, per unit, and required four operators.

If your requirements call for production brazing, soldering, hardening, annealing, stress relieving, hot forming, forging or shrink fitting, a Lindberg induction heating unit can better your production picture. Write for Bulletin 1440.

LINDBERG

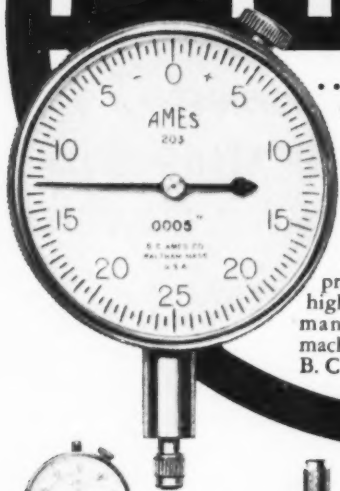
Lindberg Engineering Company



HIGH FREQUENCY DIVISION

2442 W. Hubbard St., Chicago 12, Ill.

AMES



... the preferred Dial Indicators

One of America's largest and most famous mass-producers recently chose Ames as preferred source of supply for indicator gauges. They did because the four sizes of Ames "Hundred Series" indicators fit every measuring requirement; they are *accurate, sensitive, low in friction, yet are rugged and tough* — give *more* on-the-job time. All Ames products embody latest design and highest-quality materials; they are manufactured by methods and machines that are *exclusive* with B. C. Ames Co.



Ames
Dial Depth Gauge
No. 11C

Ames
Dial
Micrometer
No. 517



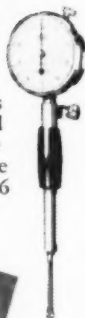
Ames
Amplifying
Dial Comparator
No. 26



Send today for your free copy
of Catalog No. 58



Ames
Small
Hole
Gauge
No. 36



Representatives in
principal cities.

B. C. AMES CO.

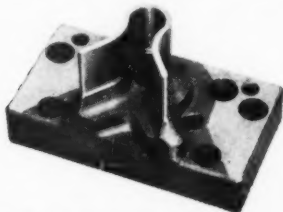
28 Ames Street
Waltham 54, Mass.

Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

YOU GET *SPEED*

PLUS *ACCURACY*

WITH MOORE JIG GRINDERS



CONTOURS, Too, Accurately Jig Ground and Checked in One Setting

This flanged punch, impractical to grind by any other method, was a natural for the No. 2 Moore Jig Grinder. All radii—male and female—were ground accurately to location and size. The piece, having been set up on a rotary table, was aligned to permit grinding of the angular surfaces. And the entire contour was inspected by the "indicator measuring" method while the punch was still on the machine.



HOLES from 1/64" to 8" Relocated and Ground within .0001" in One-Third Previous Time

Before hardening, this two-station die block was Moore-Jig-Bored to eliminate the need for excessive grinding. After hardening and surface grinding, all holes were Moore-Jig-Ground to exact size and location. Blank hole and center piercing hole were ground with 1/2" included taper. Little clearance could be allowed between punch and die. Jig grinding time: *only 2 1/4 hours.*

The word "versatile" must have been coined for the No. 2 Moore Jig Grinder. Not only does this machine relocate and grind straight and tapered holes with ease, but it **contour grinds**, chop grinds and slot grinds just as skillfully.

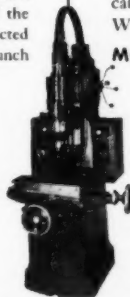
The Moore Jig Grinder, together with its tool-room teammate, the Moore Jig Borer, enables tool and die sections to be produced concurrently, puts diemaking on an interchangeable-parts-and-assembly basis. And it's also a time-saver on production jobs.

Employing the accurate lead screw measuring principle and a convenient system of coordinate hole location, the fast and sure Moore Jig Grinder eliminates hours of checking on bench and surface plate.

Why not find out how this remarkable machine can save *you* sizeable chunks of time and money. Write today for our detailed bulletin.

MOORE SPECIAL TOOL COMPANY, INC.

728 Union Ave., Bridgeport 7, Conn.



NO. 2 MOORE JIG GRINDER

Range 10" x 16" x 16" height. Grinding speeds from 12,000 to 60,000 rpm. Infinite feeds up and down; spindle-housing heat control. Features slot grinding attachment.

ADD  TO YOUR TOOLROOM

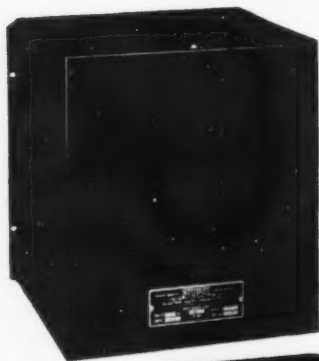
JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • DIE FLIPPERS • MOTORIZED CENTERS • HOLE LOCATION ACCESSORIES

see our catalog in
**MACHINE
TOOL
CATALOGUE**
or write for copy

June, 1953

39

GAIN THE *Full Benefits of* **MAGNETIC CHUCKING**



Manual or Motor
Control Models
for 50 to 5000
Watts. Chuck
area 60 to 7500
Sq. In. Special
Models to Suit.



ELECTRO-MATIC RECTIFIERS

Engineered for dependable power conversion for industrial purposes. Most models equipped with automatic electronic Time Delay Switch, adding years to tube life. Quiet and efficient. Fully guaranteed.

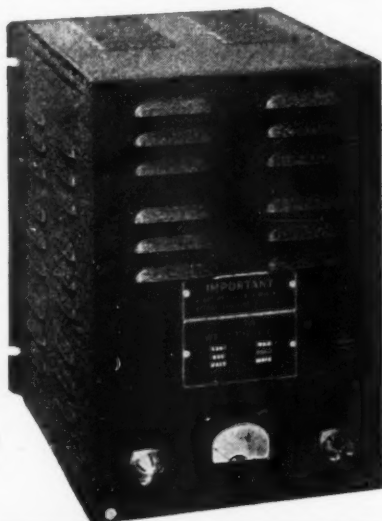
Full Particulars Without Obligation

ELECTRO-MATIC PRODUCTS COMPANY
2235 North Knox Avenue
CHICAGO 39, ILLINOIS

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ELECTRO - MAGNETIC CHUCK CONTROLS

Release and demagnetize work pieces simultaneously. No time lost. No damage to work or to chuck faces. Protect chucks from voltage surges. Speed production.

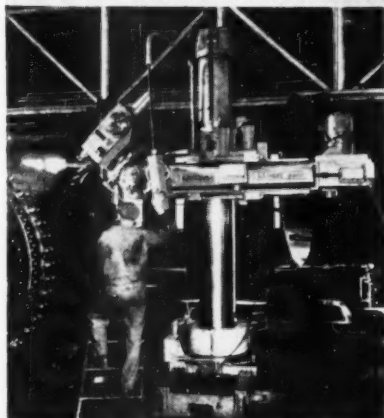


32
MODELS

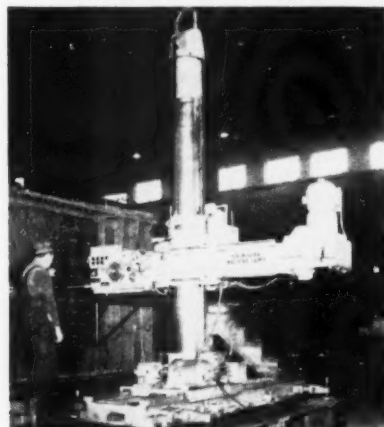
•
50 to
20,000
Watts

Kaukauna **DRILLING and TAPPING Machines**

UNIVERSAL AND HORIZONTAL



Model 125-U drilling and tapping angular holes in high pressure vessels using a 2 1/4" drill and a 2 1/2" pipe tap.



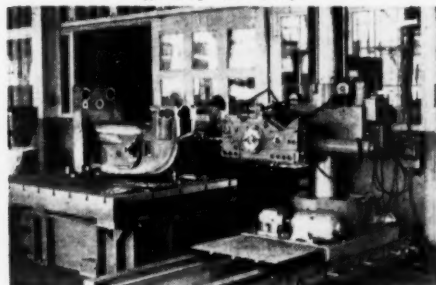
Model 125-HR drilling, reaming and back spot facing holes in a 40 cu. yd. bucket.

PROFIT FROM ANGULAR, VERTICAL AND HORIZONTAL OPERATIONS WITH 1 SETUP

Almost any casting or weldment—of almost any size and shape—can be drilled, tapped or spot-faced in any location accurately, quickly and easily with a KAUKAUNA Machine. Furnished with Universal Head with compound swivels, Tilting Head or Horizontal Head, all with 360° column swivel. Horizontal traverse on runway and vertical traverse on column to suit requirements. For portable or fixed location use.



Universal Machine drilling, tapping and doweling racks in place on floor type boring machine runways.



Model 1030 on production setup, drilling, boring and tapping horizontal holes in milling machine bases, columns, headstocks and tables.

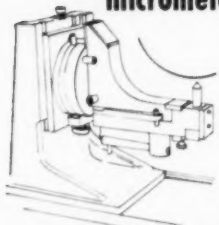


Cut your costs on setup time, crane time, fixturing and machine hours. Write for Catalog.

Kaukauna MACHINE CORPORATION

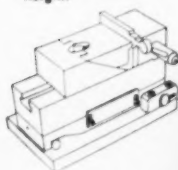
KAUKAUNA, WISCONSIN, U. S. A.

model "REC" with detachable
micrometer base



FIXTURE WITH
MICROMETER FEED

Under the wheel attachment makes it possible to dress under the wheel, maintaining any desired work height.



Precision Grinding Vise with or without sine bar allows rapid unloading and exact relocating.

ADAPTABLE TO ALL TYPES OF CYLINDRICAL AND SURFACE GRINDERS

By loosening gib, dresser can be removed from the micrometer "C" Base and affixed to solid or adjustable angle ramp for cylindrical grinding. For surface grinding the dresser is returned to "C" Base.

Photograph on right shows special compound base with micrometer lead screw having travel in four directions. Dresser usually is furnished with extra stops for zero setting.

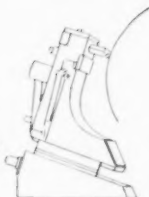
J & S TOOL CO., INC.
647 W. Mt. Pleasant Ave. Livingston, N. J.
(N. J. Highway Route No. 10)

.0001" ACCURACY

Fluidmotion WHEEL DRESSERS

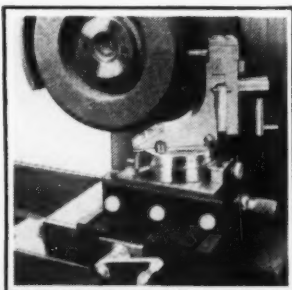
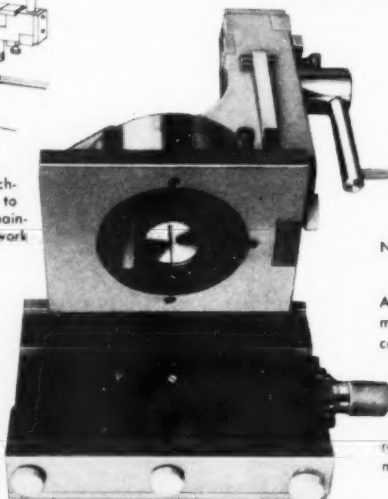
dress two angles tangent to a radius
in one continuous motion

High-Carbon, High-Chrome Construction



NEW SOLID ANGLE RAMP
WITH MICROMETER
LEAD SCREW

Allows fixed position of diamond when used in cylindrical grinding for dressing above the center line, but coincidental with the center line of the wheel. Factory will recommend proper equipment on request.



J&S
TOOL CO. INC.

A variety of models and attachments to suit your needs. Write for free catalog covering dressers in detail. J & S also manufactures a complete line of All-Purpose Jaw Machines, Clamps, Vises, and Special Tools. Write for Machine Shop "Time Savers" booklet.

J&S

A "NEW" PROCESS

CARBIDE DIE

PLUS...

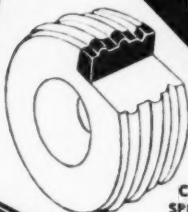
"Actual engraved letters or numbers in CARBIDE for use in stamping HARD-ENED steels"



These dies may be made to any size or shape for use as inserts in stamping and forming dies—or as separate letter or number stamps.



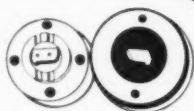
SOLID CARBIDE



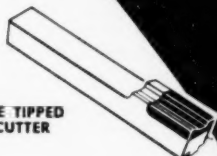
TUNGSTEN CARBIDE TIPPED SPECIAL CUTTER



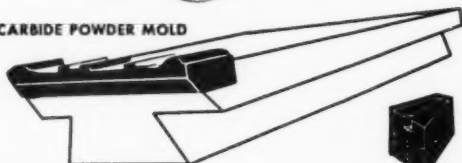
SOLID TUNGSTEN CARBIDE END MILL



CARBIDE POWDER MOLD



CARBIDE TIPPED FORM CUTTER



TUNGSTEN CARBIDE TIPPED FLAT FORM TOOL



DIE SECTIONS SOLID CARBIDE



TUNGSTEN CARBIDE HEADING PUNCH



TUNGSTEN CARBIDE DIE SECTIONS

Send a drawing, rough sketch or sample of what you would like in carbide for our quotation. Our trained carbide specialists will provide the special tools or adaptations you need at a reasonable price.



B-M-S CARBIDE SPECIALTIES, INC.

1000 NORTH MAIN ST., BOONTON, N. J. • PHONE BOONTON 8-0071

PRECISION IN CARBIDES AND STEELS

When you want on any cutting-tool

here are 5 reasons to call your

MORSE- Franchised DISTRIBUTOR

● **COMPLETE LINE:** Drills, Taps (including a new line of Special-Purpose Taps . . . and 7 new basic and conversion sets of Taps and Dies, handsomely boxed), Dies, Reamers, Cutters, End Mills, Counterbores and Countersinks.

● **AMPLE STOCKS:** Your Morse-franchised Distributor is ready to supply you with the Morse Quality Cutting Tools you need. *New Morse methods of production, inventory control and expediting put him in a far stronger position in '53 than ever before.*

● **ON-THE-JOB EXPERIENCE:** Your Morse-franchised Distributor knows his way around on cutting-tool applications, to give you *increased production and reduced costs.*

● **CLOSE CO-OPERATION FROM MORSE ENGINEERS:** On any "cranky" or special problem, your Morse-franchised Distributor can immediately summon the help of Morse's top technical men.

● **PROVEN RESPONSIBILITY:** Your Morse-franchised Distributor is a respected member of your business community. You can have full confidence, *as Morse has, in him and his men.*

THAT'S WHY IT'S ALWAYS GOOD BUSINESS TO
"CALL YOUR MORSE-FRANCHISED DISTRIBUTOR"

MORSE TWIST DRILL & MACHINE COMPANY, NEW BEDFORD, MASS.
(Division of VAN NORMAN CO.)

Warehouses in New York, Chicago, Detroit, Houston, San Francisco

ACTION!

problem . . .



MORSE-FRANCHISED DISTRIBUTOR

MORSE

Cutting Tools

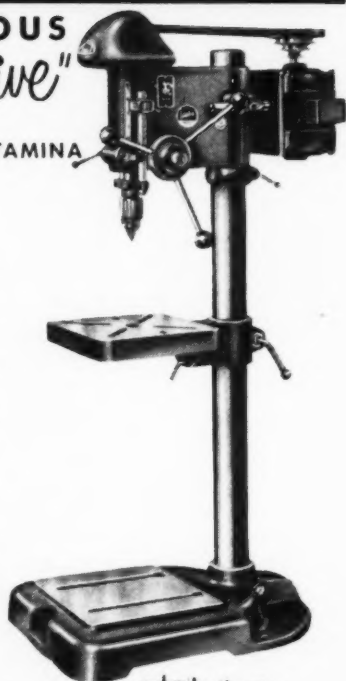
*Buy them by phone
from your Morse-Franchised
Distributor and save
ordering time*

ATTACK COSTS NOW... WITH *Atlas* TOOLS!

Atlas
**15"
DRILL
PRESS**

WITH FAMOUS
"Floating Drive"
SMOOTHNESS AND STAMINA

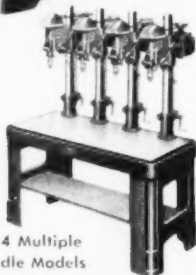
When management says, "We've got to cut manufacturing costs," these economical $\frac{1}{2}$ " capacity Atlas drill presses can be a big help. They have the accuracy and rugged construction for 'round the clock drilling and tapping. Heavier head, table, column, and base—plus $\frac{1}{4}$ ball bearing "floating-drive" assure lasting accuracy. Exclusive depth stop control—slo- or high-speed models. Ask your Atlas dealer or send for latest catalog.



15" Bench Model



Foot Lever Feed-Control
for 15" Floor Model



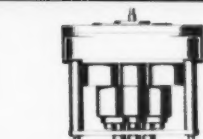
2-3-4 Multiple
Spindle Models

Atlas

ATLAS PRESS COMPANY
609 N. PITCHER STREET, KALAMAZOO, MICH.

DEPENDABLE QUALITY TOOLS SINCE 1911

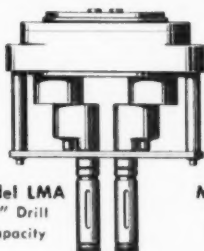
HEADS to Solve Your Drilling, Tapping, Boring Problems



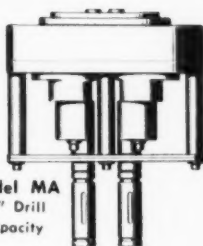
Model ELA
1/4" Drill
Capacity



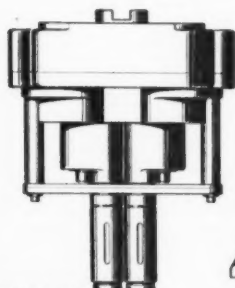
Model LA
13/32"
Drill Capacity



Model LMA
3/8" Drill
Capacity

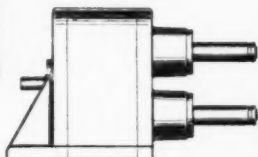


Model MA
3/4" Drill
Capacity



Model HA
1 1/4" Drill Capacity

Fixed Spindle Models
Size and Capacity
as specified



WISCONSIN Adjustable Spindle

Drill Heads completely gear driven . . . are available in 5 Standard Models, with 2 to 8 spindles and Drill Capacities from 1/4" to 1 1/4" . . . permit adjustment to any hole pattern. Adjustable Heads with 9 or more spindles are built-to-order.

WISCONSIN Adjustable Spindle

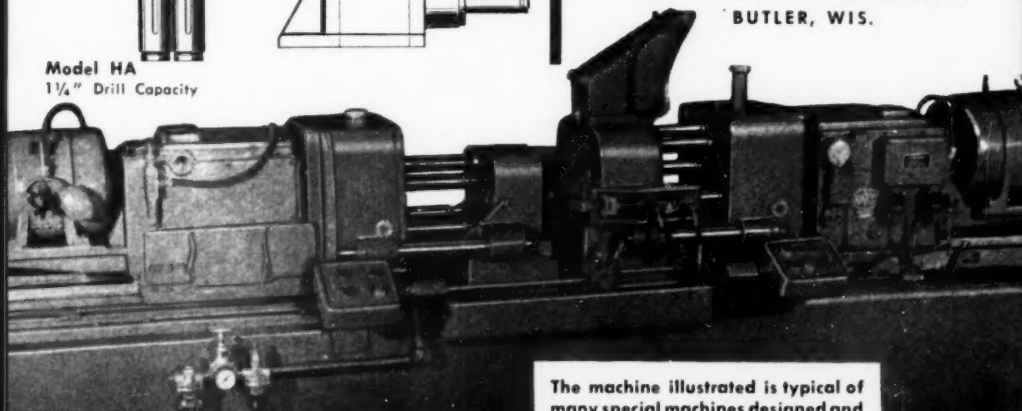
Drill Heads . . . have Two-Piece Positioning Templates for Fast, Accurate Set-ups that stay put.

WISCONSIN Fixed Spindle

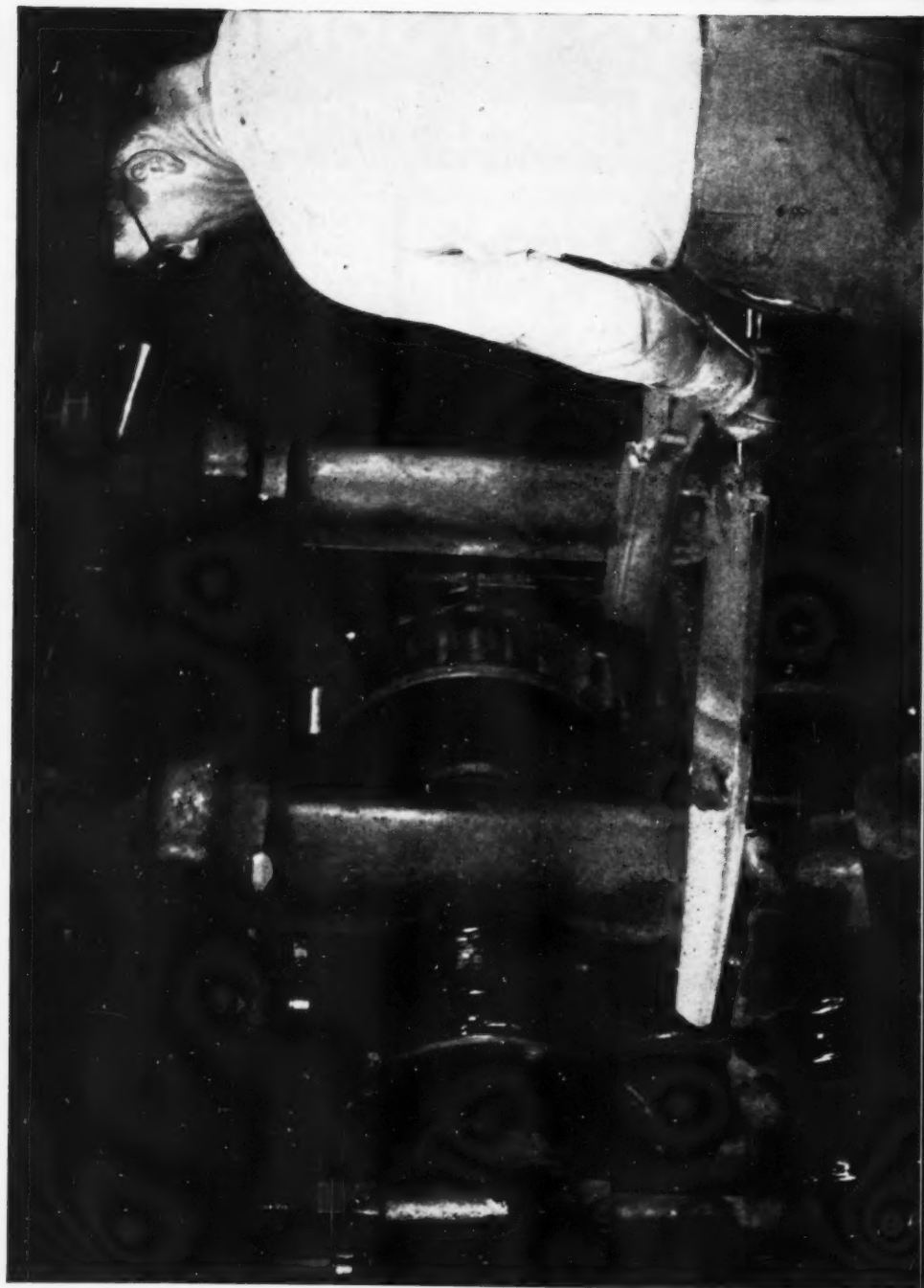
Drill Heads are built to special order in any size or capacity specified for Drilling, Tapping, Reaming and Boring.

Look to Wisconsin for Drill Heads to solve Your Problems.

**WISCONSIN
DRILL HEAD COMPANY**
BUTLER, WIS.



The machine illustrated is typical of many special machines designed and built by Wisconsin Drill Head Co. for high production drilling, boring, tapping and reaming operations.



10 TIMES

THE PRODUCTION LIFE

FROM THESE "CAST-TO-SHAPE" SWAGING DIES

The John Deere Plow Works of Deere & Company formerly used cast grey-iron dies to swage AISI 1070 F steel plow beams. Die life was, at best, a mere six weeks or about 8,000 parts.

They switched to A-L CAST-TO-SHAPE swaging dies of FCC No. 66 tool steel, hardened and drawn to 57-58 Rockwell "C". The new dies ran *fourteen months*—eight hours a day, five days a week—before redressing was necessary. Approximately 83,875 *Parts* (over ten times the pro-

duction) were swaged in that period! Production has been maintained at that level since.

You, too, can save time and money with the modern FCC CAST-TO-SHAPE method of tool and die making. Don't forget, you also buy *less* steel and reduce machining costs. It's a matter worth investigating. • Check with your A-L representative **TODAY** . . . or write *Allegheny Ludlum Steel Corporation, Oliver Building Pittsburgh 22, Pennsylvania.*

SEND FOR THIS NEW CATALOG

"FORGING AND CASTING PRODUCTS"

It's hot off the press with full details on FCC Air Hardening, Oil Hardening and other Cast-to-Shape Tool Steel Specialties that can save you time and money . . . also Composite Die Sections, and Smooth-Hammered Forgings in a wide range of tool and stainless steels. *Don't wait—get your copy NOW.*

Write Today

ADDRESS DEPT. MB-42



For complete **MODERN** Tooling, call
Allegheny Ludlum



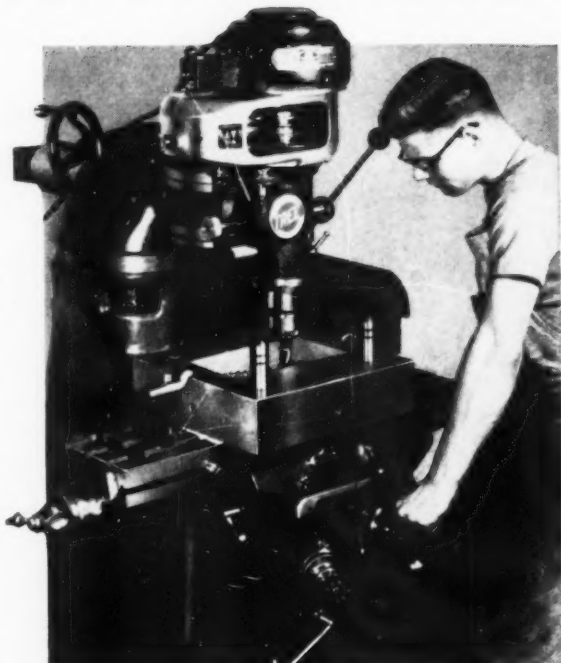
"A REAL TIME SAVER FOR OUR TOOL SHOP"

We have been using the TREE Milling Head Attachment in our tool and mold shop since 1947 and have found it to be a very rigid head for all milling operations. Its greatest value to us has been the time saved in cutter changes.

Of almost equal importance to us is the secure locking of the cutter itself in the collet. We now have four of the Tree heads in daily operation and have never experienced loosening or traveling of cutters in work.

signed,

D. P. Richards, Pres.
RICHARDS TOOL & MOLD CO.



TREE MILLING HEAD ATTACHMENT

The versatile Tree Milling Head Attachment will speed up tool room operations in your shop. It's a precision unit that does milling, drilling or boring operations . . . AT ANY ANGLE. Greater capacity enables use of tools with shanks up to $\frac{3}{4}$ ". Equipped with power feed . . . automatic collet closer. Compact design . . . 4" quill travel. . . . Eight speeds—140 to 3500 RPM or 210 to 5200 RPM. Hardened and ground spindle and quill. . . . Enclosed micrometer depth stop. Write for complete specifications today.

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TREE TOOL AND DIE WORKS
1600 JUNCTION AVENUE RACINE, WISCONSIN

Sid Tool
Company

WHY WAIT FOR SPECIAL TAPS?

**... Has them IN STOCK
for IMMEDIATE DELIVERY!**

HIGH SPEED SPECIAL RIGHT HAND TAPS

SIZE	THREAD	SIZE	THREAD	SIZE	THREAD
4	32-48-60-64	3/8	12-16-18-20-27-28-32-36-40-48	1-3/4	8-10-12-14-16-18-20-24
5	36-32-36-48-80	7/16	12-16-18-22-24-27-28-30-32-36-40	1-13/16	8-10-12-14-16-18-20
6	36-40-48-56-60	1/2	12-14-16-18-22-24-26-27-28-30-32-40	1-7/8	8-10-12-14-16-18-20
7	32-40	9/16	16-20-24-27-28-30-32-40-48	1-15/16	8-10-12-14-16-18-20-24-28
8	24-30-38-38	5/8	12-14-16-20-24-27-28-32-36-40	2	16-18-20-24-28
9	24-28-32-40	11/16	11-16-18-20-24-27-28-30-32		4-1/2-6-10-12-16-18-20
10	28-30-36-40	3/4	9-11-12-14-16-20-24-26-27-28-32	2-1/16	12-14
12	20-26-32-38	13/16	10-14-18-20-32	2-1/8	12-16-20
14	20-24-28	7/8	10-12-16-18-20-24-27-28-32	2-3/16	12-16
1-1/8	60-64	15/16	8-9-10-12-14-16-18-20-24-32	2-1/4	4-1/2-6-12-14-16-18
5/8	72	1	10-12-16-18-20-24-27-32-40	2-5/16	12-18
3/32	48	1-1/16	12-14-16-18-20-24	2-3/8	12-18-18
7/64	48-56	1-1/8	8-10-14-16-18-20-24-32	2-1/2	8-10-12
1/8	32-40	1-3/16	8-10-12-14-16-18-20-24	2-9/16	18
5/32	32-38-40	1-1/4	8-10-14-16-18-20-24-32	2-5/8	12-16-20
9/64	36-40	1-5/16	12-14-16-18-20-24-32	2-3/4	16
11/64	38	1-3/8	8-10-14-16-18-20-24	2-7/8	8-12-18
3/16	20-24-32	1-7/16	8-10-12-16-18-20-24	3	8-18
13/64	32	1-1/2	8-10-14-16-18-20-24-28	3-1/4	8-12-18
7/32	24-28-32	1-9/16	18-20-24	3-1/2	8-12-18
1/4	18-24-26-27-30-32-36-40	1-5/8	5 1/2-8-10-12-13-16-18-20-24	3-7/8	8
5/16	16-20-22-27-28-32-40	1-11/16	10-12-14-16-18-20-24	4	8-12



HIGH SPEED LEFT HAND TAPS

SIZE	THREAD	SIZE	THREAD	SIZE	THREAD
0	80	3/8	16-24-32	1-5/8	8-10-12-16-18-20-24
1	56-64-72	7/16	14-20-28	1-7/16	8-10-12-14-16-18-20
2	56-64	1/2	12-13-20-28	1-1/2	6-8-10-12-16-18-20
3	56	9/16	12-18-20-24	1-9/16	8-10-12-16-18-20
4	32-36-40-48	5/8	11-12-18-20-24	1-5/8	8-10-12-14-16-18-20
5	40-44	11/16	11-16-24	1-11/16	8-10-12-14-16-18-20
6	32-36-40	3/4	10-16-18-20	1-3/4	8-10-12-14-16-18-20
8	32-36-40	13/16	16	1-13/16	8-10-12-14-16-18-20
10	24-30-32-40	7/8	8-12-14-16-20	1-7/8	8-10-12-14-16-18-20
12	24-28-32	1	9-12-14-16-18-20	1-15/16	8-10-12-14-16-18-20
1/4	20-26-32	1-1/8	7-12		
5/16	18-20-24-28-32	1-1/4	7-12-16-18	2	4 1/2-10-12

• SPECIAL AND LEFT HAND DIES IN STOCK

Prices on Application We are always adding new sizes

NOTE: Oversize — Undersize — Metric — 64th and 32nd
Size Taps Available for Quick Delivery.

DEALER INQUIRIES INVITED

SID TOOL COMPANY, INC.
CUTTING TOOL SPECIALISTS
126 LAFAYETTE STREET • NEW YORK 13, N. Y.

• Are you on our
monthly mailing
list? Write Dept. B.

PHONE: BE 3-4270

The fable of

The Three Brothers

**HOLDS A LESSON
FOR CUTTING FLUID USERS**



THREE brothers inherited equal shares of their father's farm. One brother feverishly worked his land, with seldom a rest, until prematurely worn out, he died at an early age. The second brother loafed and played until his land went to ruin and he died for want of food. The third brother, wiser than the other two, balanced his work and play, so that he prospered mightily and lived to a ripe old age.

The Lesson

BALANCING the *chemical activity* of cutting fluids produces best results, too.

Figure 1 shows abnormal front clearance wear of a single point tool due to *excessive* chemical activity of the cutting fluid used. The tool failed prematurely, just like the first brother in the fable.

Figure 2 shows abnormal cratering of a tool due to *insufficient* chemical activity of the cutting fluid used. Such cratering is usually associated with poor surface finish. This tool failed prematurely like the indolent brother in the fable.

The *proper balance of chemical activity* gives the most profitable results. For the right cutting fluids for your work, ask to have your Stuart Oil Representative call, or write:

D.A. Stuart Oil co.
EST. 1865 LIMITED

TIME-TESTED CUTTING FLUIDS AND LUBRICANTS

2749 S. Troy St., Chicago 23, Ill.

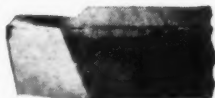


FIG. 1 — Abnormal front clearance wear caused by excessive chemical activity of cutting fluid.

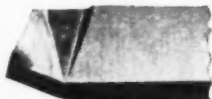


FIG. 2 — Cratering of cutting tool, usually associated with poor finish, resulting from insufficient chemical activity of cutting fluid used.

More Than a
"Coolant"
is Needed

INGERSOLL



BLADES: \$117³⁰

CHIPS: 27 TONS

Equipped with 34 carbide-tipped blades costing only \$117.30, this 24" diameter Ingersoll Shear Clear Face Mill removes 27 tons of hard die block steel before the blades are used up in resharpening.

Blades for Ingersoll cutters are of the highest quality, yet they are the most economical for you to buy because they are manufactured with good production equipment.

The low cost of replacement blades is another reason why you should use

INGERSOLL INSERTED BLADE MILLING AND BORING TOOLS

THE INGERSOLL MILLING MACHINE CO.

ROCKFORD, ILLINOIS



**WRITE FOR NEW
INGERSOLL CUTTER
CATALOG No. 60E**

THIS PLACE NEEDS . . .



A WESSON UNIVERSAL VISE

Speedy, precision angle set-ups are simple, fast and economical when you use Wesson's 3-way Universal. Wesson angle vises eliminate many costly special fixtures.



WESSON

Universal **VICES**

BUILT TO WESSON STANDARDS OF
QUALITY AND PRECISION

WESSON PRODUCTS CO.
1220 Woodward Hts. Blvd.
Ferndale (Detroit 20), Mich.

Please send me illustrated
bulletin of WESSON Univer-
sal VISES and ANGLE PLATES.

Name and Title

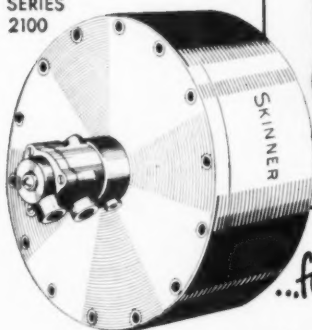
Firm Name

Address

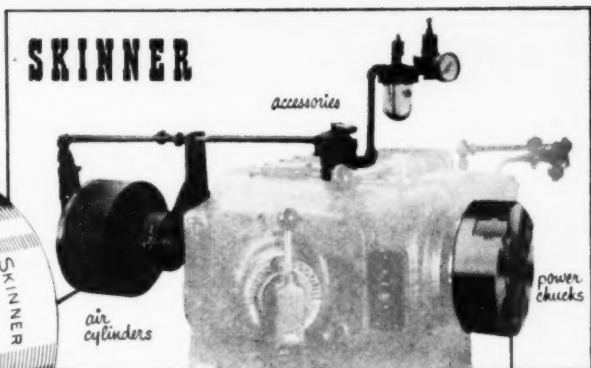
City

State

SERIES
2100



SKINNER



...for every high production need!

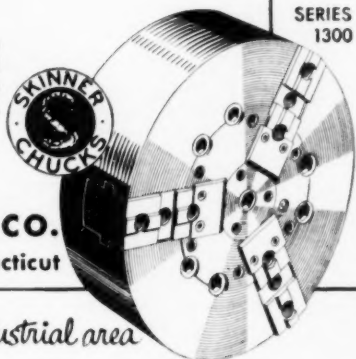
Skinner Chucks are available from 6" to 21" with forged steel bodies, and with either 2 or 3 adjustable or non-adjustable jaws. Exclusive sliding wedge construction grips internal or external work positively, and will not release the work, even if air line is broken, until operator actuates draw bar. Double-acting rotating (Series 2100 for speeds up to 1500 R.P.M.) and non-rotating air cylinders are available with semi-steel bodies for all sizes of power chucks, holding fixtures and tailstocks. Series 2200 double-acting rotating air cylinders have aluminum bodies for operation up to 3000 spindle R.P.M. Skinner accessories include hand-operating valves—complete air unit—filters—soft blank top jaws; draw bars—draw tubes, etc.

Write for catalog on the Skinner line of power and manually operated chucks. And ask about movie, "Chucks and Their Uses"—available for free showings.

THE SKINNER CHUCK CO.
207 Edgewood Ave., New Britain, Connecticut

Sold by leading distributors in every industrial area

SERIES
1300




P.I.T.-TESA

We present ...

Micromaster

Patent Pending

SPECIAL FEATURES

Miniature gears, actuating figures, which appear in white on black in openings in the thimble.

Graduation lines on thimble and sleeve not one above the other, but side by side.

Measuring spindle is guided in a firm nut, without slot. Nut can be adjusted.

Though not bigger than the usual type of micrometers, it is much more accurate, and can be read with great precision.

Our latest measuring instrument

Without equal in the world



ADVANTAGES

- 1** Direct reading to $1/1000''$
no calculation
- 2** Reading to $1/10000''$ no
error due to parallax
- 3** Reduction of longitudinal
play, highest degree of ac-
curacy

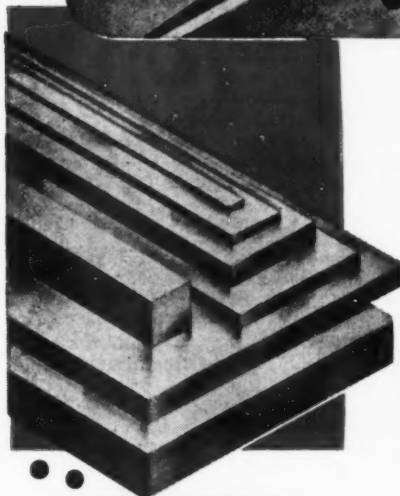
Consult your local distributor. If he cannot supply you, write us for complete details and literature.

**P.I.T. PRECISION INSTRUMENT
& TOOL CORPORATION**
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Pick!*

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OIL HARDENING



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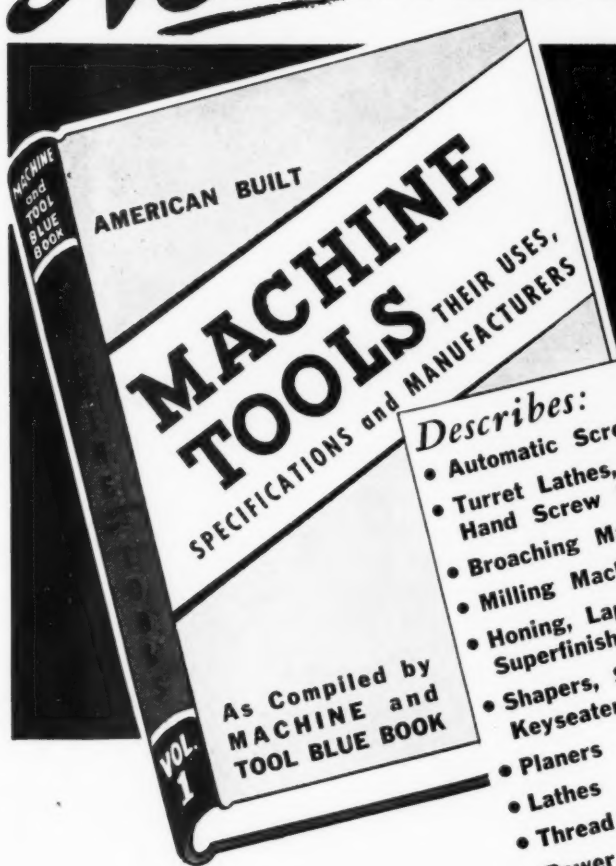
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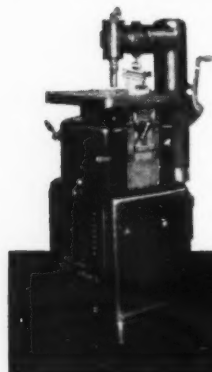
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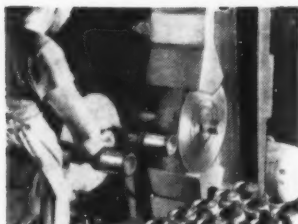
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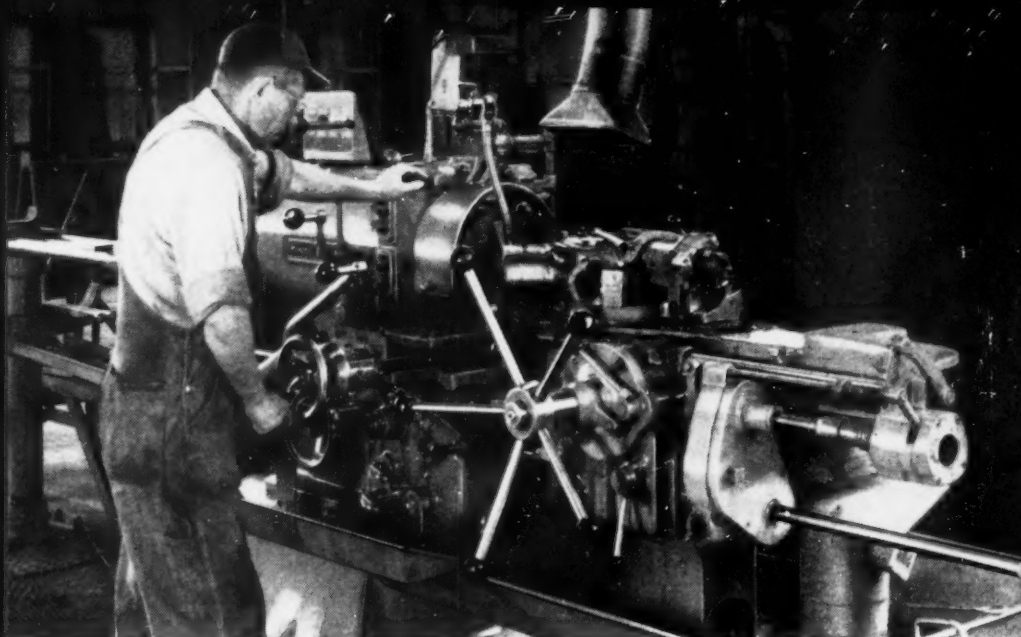
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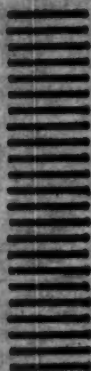
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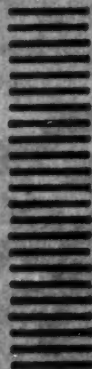
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3	13	23	33	43	53
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7	17	27	37	47	57
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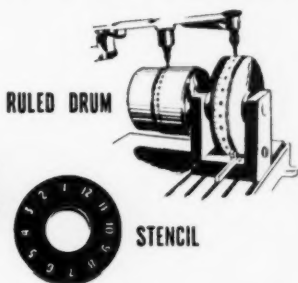
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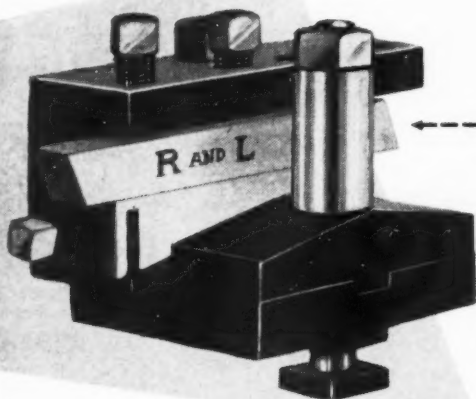
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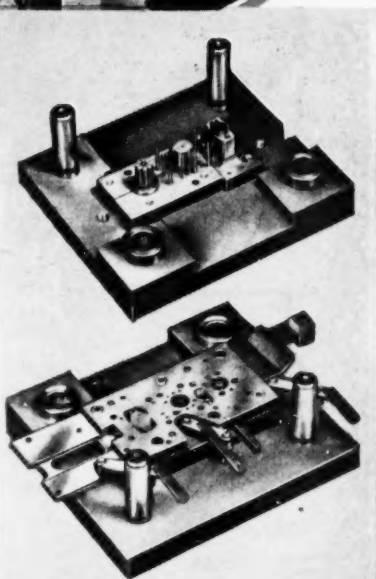


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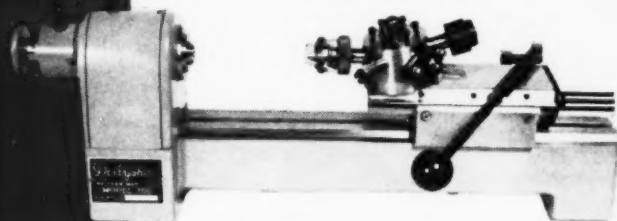
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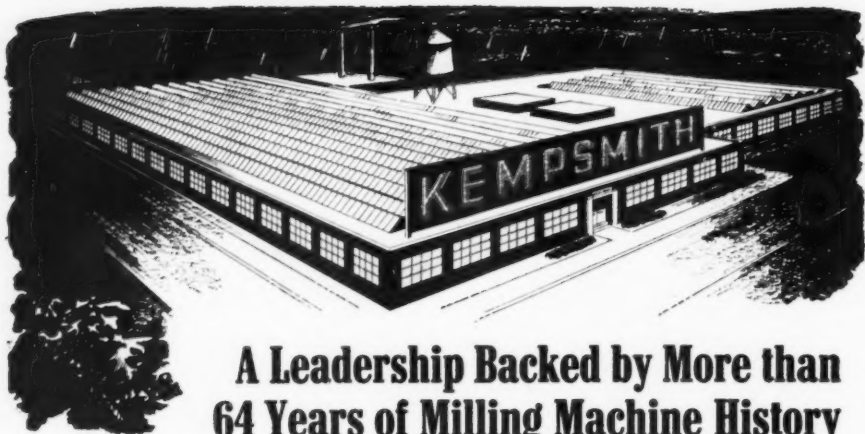


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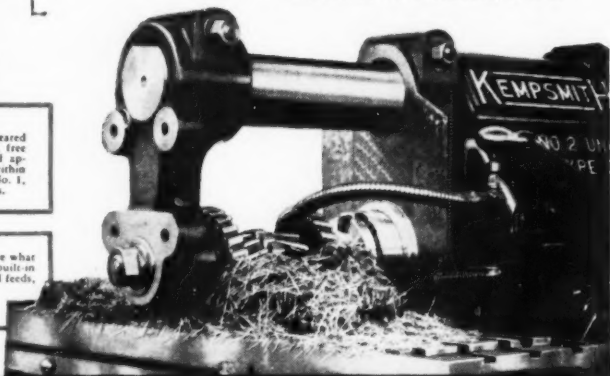
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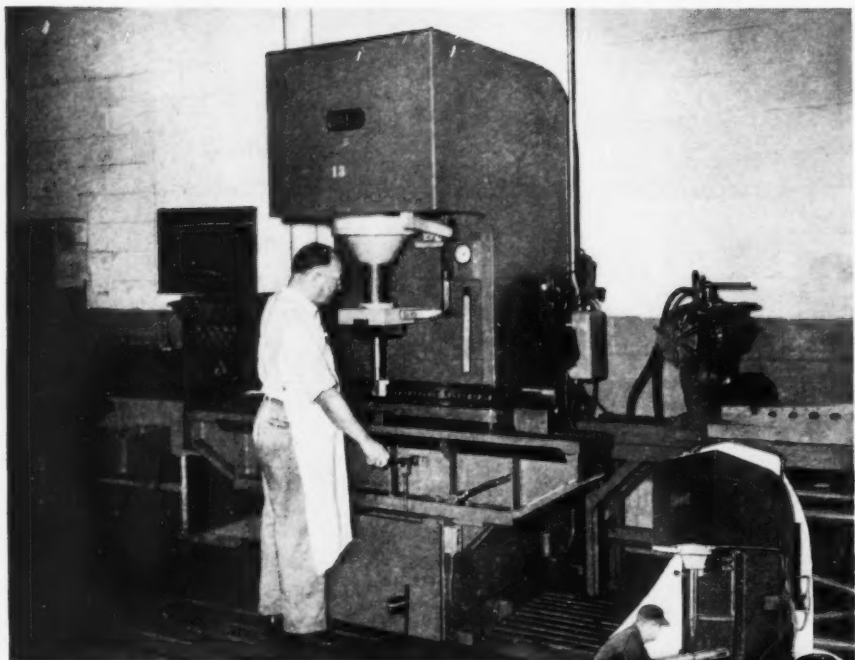
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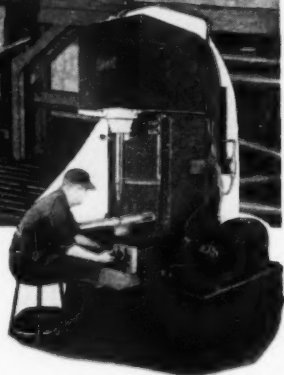
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Presses like that shown in the photograph above.

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15" 55 lb. Channel		15 seconds
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100 lb. A R A. Rail		9 seconds
6 1/2" x 6 1/2" x 19.8 lb. Tee		5 seconds
8" x 8" x 1/4" Angle		11 seconds
3" Square		10 seconds
4" Round		15 seconds
6" O.D. Tube, 1/2" Wall		11 seconds

† Approximate Times

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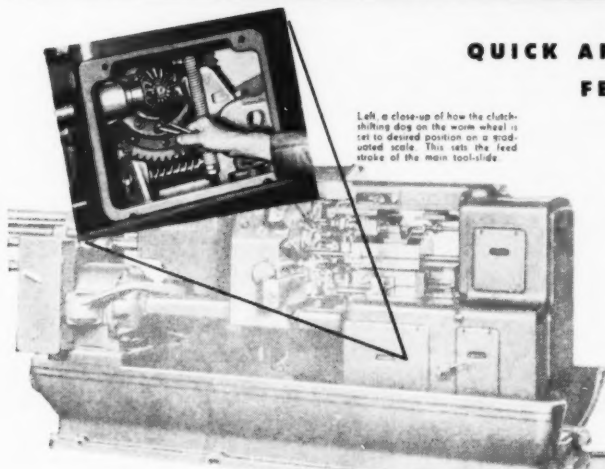
GREENLEE

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QUICK AND EASY FEED STROKE

ADJUSTMENT

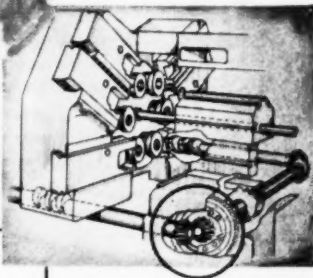
On Greenlee Automatics, main tool-slide feed stroke adjustments are made by adjusting only one dog on a graduated worm wheel, as illustrated by the inset picture at the left. The details of this arrangement, and particularly the relation of the worm wheel to the main tool-slide drive, are shown and explained in the other pictures and captions.



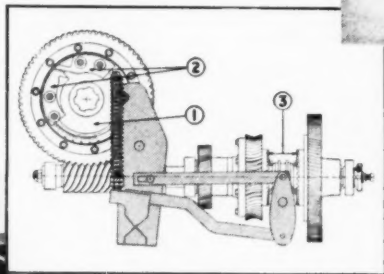
Left, a close-up of how the clutch-shifting dog on the worm wheel is set to desired position on a graduated scale. This sets the feed stroke of the main tool-slide.

Changes can be made in 5 minutes

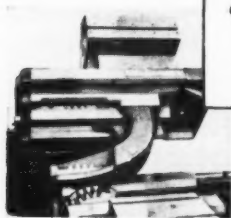
Precise adjustments of the main tool-slide stroke can be made easily in less than five minutes. To save time in making preliminary settings, two additional scales are provided, one on each side of the tool-slide, with graduations corresponding to those on the worm wheel.



The drawing at the right shows how the clutch, worm and worm wheel, and clutch shifting levers are related. Numbers indicate (1) the graduated worm wheel, (2) the clutch shifting dog, and (3) the main drive clutch.



At the left is a view of the tool-slide removed and tilted back. The intermittent feed gear provides a full stroke each cycle, with fast approach and a smooth shut into feed. The main clutch is shifted automatically.



The cutaway diagram above shows, in the circle, the location of the graduated worm wheel on the end of the shaft that carries the intermittent feed gear.

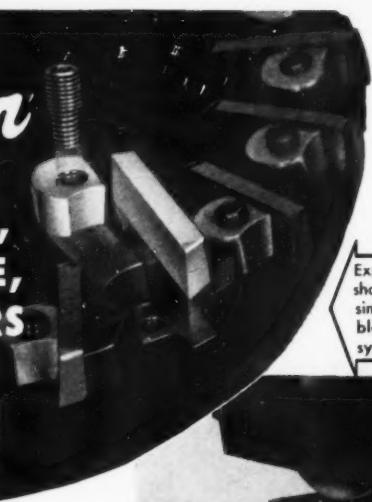
Write for FREE
Literature



GREENLEE BROS. & CO.
1836 MASON AVE., ROCKFORD, ILL.

Beaver

**SOLID CARBIDE,
INSERTED BLADE,
MILLING CUTTERS
OFFER MANY
ADVANTAGES**



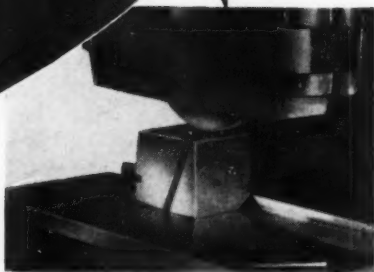
Exploded view showing Beaver's simple, positive, blade locking system.



The Beaver system of fast, accurate, cutting-blade maintenance is a time and money saver.

Beaver's blade-grinding fixture enables you to grind blades individually and uniformly on your own surface grinder. This system also permits accurate sharpening for short overhang set-up, which means less breakage, longer blade-life and less down-time for repair. Individual sharpening results in less blade-loss per sharpening. Extra sets of sharpened blades can be kept on hand.

With Beaver's specially designed, blade-setting fixture you can install new blades quickly and accurately. The entire Beaver operation of removal, sharpen and reset, cuts "in assembly" sharpening time in half.



Beaver Blade-grinding fixture.



Beaver Blade-setting fixture.

See our Catalog 52 for cost reducing Beaver Tools

Beaver TOOL AND ENGINEERING CORPORATION

2850 ROCHESTER ROAD • BOX 429, ROYAL OAK, MICH. Teletype - Big Beaver 648



Motor-Driven Centrifugal Pumps That Dirt Can't Hurt!



Here's a complete line of ten different Motor-Driven Centrifugal Pumps that are completely protected from damage by dirt or abrasives. Hydraulically balanced, their design provides stability without using a bearing at impeller end of shaft . . . eliminates metal-to-metal contact below water level. All motors are of standard NEMA design, for easy replacement,

and totally enclosed against dust or vapor . . . no lubrication or maintenance required.

The design simplicity and sound construction of these Brown & Sharpe Pumps makes them ideal for applications where grit or foreign substances may be present. Write for Pump Catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

BUY THROUGH YOUR LOCAL DISTRIBUTOR

Brown & Sharpe

SPEEDY AIR VISE

SPEEDS UP

✓ MILLING

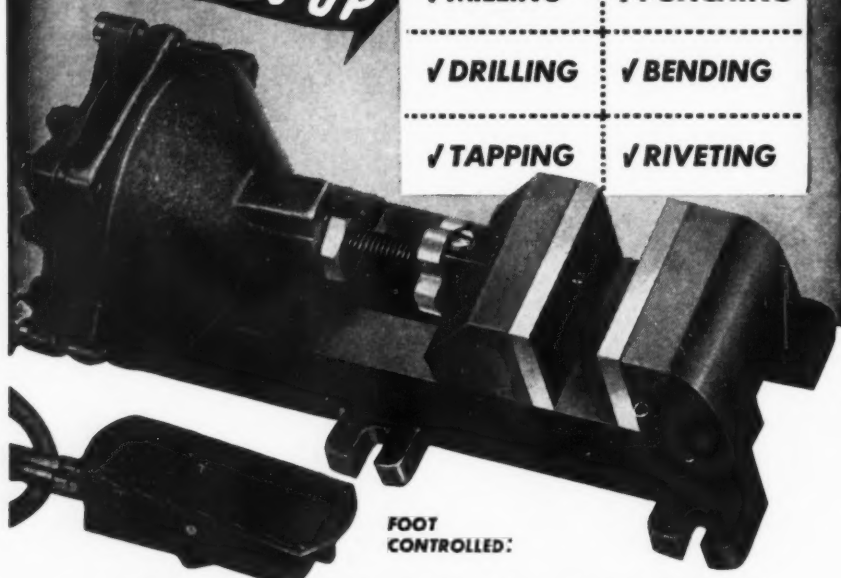
✓ PUNCHING

✓ DRILLING

✓ BENDING

✓ TAPPING

✓ RIVETING



**FOOT
CONTROLLED:**

GRIPPING FORCE 15 TIMES AIR LINE PRESSURE

Speedy Air Vise helps you do dozens of operations faster, better, cheaper—by air pressure! Foot control valve opens and shuts vise instantly, leaving *both* hands free to produce *more*! Jaw opens up to 3 inches, holds castings, parts, jigs, etc. Compact, trouble-free, inexpensive.

Complete with Foot Control Valve, Air Hose and Fittings . . . only **\$36.00**

ORDER FROM YOUR MILL SUPPLY DEALER OR WRITE DIRECT

	<p>AIR REGULATOR Precision - built. Delivers pressures up to 140 lbs. With gauge, \$5.95 Less gauge, \$3.25</p>		<p>AIR FILTER Keeps water and particles out of the regulator and pneumatic tools. \$3.00</p>	<p>BLOW-GUN Looks and operates like a gun. Ideal for cleaning and blowing out chips, dust, filings, scraps, etc. . . \$3.00</p>
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W. R. BROWN CORP. • 5723 ARMITAGE AVE. • CHICAGO 39, ILL.

Save FABRICATION TIME

with
STANDARDIZED
DIE SECTIONS



To substantially reduce your die building time, R-B manufactures standardized composite die sections that are entirely prefabricated and ready for mounting on your die shoes. These R-B die sections eliminate all of your machining, drilling, hardening and grinding.

Series A, B & C die sections have straight tool steel lands, which are hardened and ground; and mild steel bases, which permit drilling of dowel pin holes. Die sections in this series are available in lengths from 6" to 12" inclusive in increments of 1"; and in heights of 1 3/8", 1 7/8" and 2 1/2".

Also available are series AA, BB and CC die sections having wider lands which permit contouring before hardening. These standardized die sections have the same general construction as series A, B & C illustrated to the left.

TOOL STANDARDIZATION IS THE BASIS FOR SAVING PRODUCTION TIME. WITH R-B YOU GET THE ACCEPTED STANDARD OF THE SHEET METAL INDUSTRY—IN STANDARD DESIGN FEATURES THAT SAVE IN ENGINEERING, DIE CONSTRUCTION AND OPERATION.



RICHARD BROTHERS DIVISION
ALLIED PRODUCTS CORPORATION
DEPT. 71 • 12621 BURT RD. • DETROIT 23, MICHIGAN

Also Produced in Allied's Four Plants . . . HARDENED AND PRECISION GROUND
PARTS • STANDARD CAP SCREWS • SPECIAL COLD FORGED PARTS •
SHEET METAL DIES • ALLITE DIES CAST OF ZINC ALLOY • JIGS • FIXTURES



The Land You Build On Requires Marking Devices



When measuring land areas or construction sites, surveyors mark boundaries with stakes or chalk. Working crews then can depend on these marking devices to insure dimensional limits and safeguarding of property rights.



PUNCH PRESS DIE
Faithfully reproduces and is particularly adapted to large production marking.



SOLID ROLL DIE
Assuring the utmost in accuracy—used in marking machines, lathes and screw machines.



ENGRAVED STEEL SEGMENT DIES
Segment die system ideal for stamping circular and flat work (trademarks, sizes, etc.).

Write for Bulletin SE-130

CADILLAC 45 HYDRAULIC MARKING MACHINE

The Perfect Machine for Flat, Round and Contour Marking

Compact, self-contained and manifold mounted, this machine gives full range of marking depth with one control from extremely shallow impression up to very deep impression. It will mark round, flat and irregular surfaces. Features: repeat action; capacity up to 110 one inch strokes per minute; up to 12,000 lbs. pressure.



For full information, write for Bulletin H-45

CADILLAC STAMP CO.

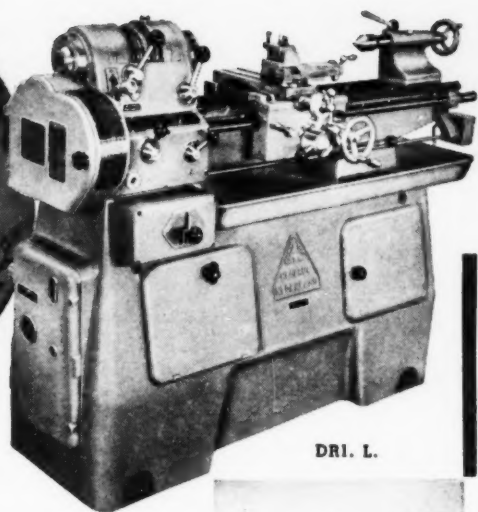
FACTORY and OFFICES

17321 RYAN ROAD • DETROIT 12, MICH.

TOOL ROOM ACCURACY and PRECISION LATHE PERFORMANCE



*is yours,
Right now!*



DRI. L.

Don't wait any longer! This is the Lathe for you. Years of development and know-how are packed into this  Netherlands-Arsenal economical, efficient, Precision Tool Room Lathe.

Investigate its many valuable features . . . quality at Low Cost.

- Swing over ways—10 $\frac{5}{8}$ "
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- Attachments available for Coolant, Universal Indexing, Taper Turning, Hydraulic Copying & other purposes

Equipped with graduations and electrical controls to fit American Requirements.

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NO PRIORITY

EXCLUSIVE IMPORTERS for U.S.A. and CANADA



AMLINTOOL, INC.

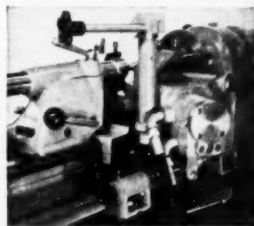
18 Beckley Avenue, Stamford, Conn.

Send for the new catalog or ask for a demonstration of  Machine Tools



▲ Main spindle

Hydraulic tracer unit
on rear side of slide ▼





Precision



ROTARY SURFACE GRINDERS for Jet and Piston Engine Airplane Parts

THE MODEL "A"

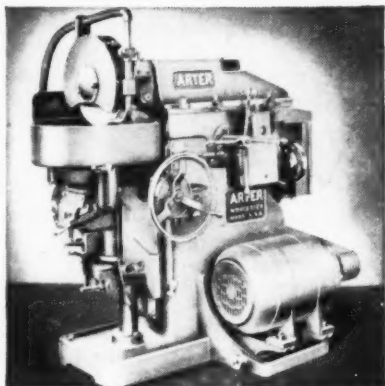
Model "A". Grinding is done on the periphery of the wheel, the work being held by a rotating magnetic chuck. Two sizes: 8" and 12" diameter.

THE MODEL "B"

Model "B". Four chuck capacities — 20", 24", 30" and 40". These machines are mainly hydraulically operated. Great vertical capacity. Work table can be tilted.

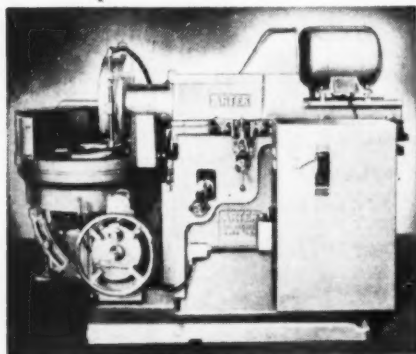
THE MODEL "D"

Model "D" — two chuck capacities — 12" and 16". A 7½ h. p. motor, precision balanced, mounted on the wheel slide delivers full power by multiple vee belts, to the wheel spindle.

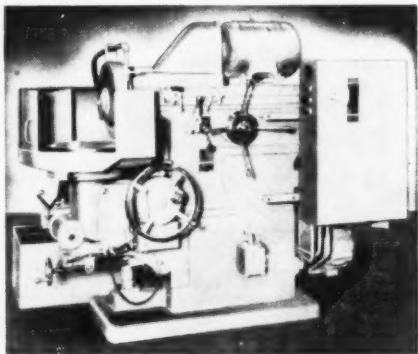


MODEL "A"

MODEL "B"



MODEL "D"



Write today for complete details and specifications

Arter GRINDING MACHINE CO.

WORCESTER 5, MASSACHUSETTS

Savings reported by users of **LINCOLN PARK** **CARBIDE GAGES**



CARBIDE CUTS GAGE CHECKING
puts over \$20,000.00 annually
in our pocket.

A large midwestern motor manufacturer, who has about 100 gages in constant use, found it necessary to check his steel gages for accuracy every day. Changing from steel to carbide gages eliminated this daily checking requirement and he now checks his carbide gages once every 12 weeks. It costs \$.85 to check each gage and based on a 250 day, 50 week year his annual savings with carbide gages are \$20,896.00 on checking costs alone.

For further information on how to reduce inspection costs with carbide gages, send for booklet—"If steel gages were FREE."



DESIGNERS AND MANUFACTURERS OF:

SPECIAL AND STANDARD CARBIDE, CHROME PLATED, AND STEEL GAGES—CARBIDE ROTARY FILES—ALSO, FACILITIES AND SKILLED PERSONNEL AVAILABLE FOR PRECISION PARTS PRODUCTION.



THE PLUS IN PRECISION

Lincoln Park

INDUSTRIES, INC.

1719 FERRIS AVENUE

LINCOLN PARK 25, MICH.



pneumatic feed — for speed
... on the SEMI-AUTOMATIC

Nichols Miller

In selecting the Nichols Miller with pneumatic table feed, you obtain precision and a high-production semi-automatic machine. The push-button controlled power feed is entirely automatic — leaves the operator free to merely load and unload the work. Often he may run two or three millers with ease. The air cylinder works against the cutter and the hydraulic cylinder — completely eliminating chatter and table jump. The unit provides rapid advance from loading position to the cutter, infinitely variable cutting feed, and rapid return to loading position. Also available with power vertical feed to spindle head. If you want high production to "tenths", investigate the Nichols Semi-automatic!

"the miller that uses its head!"

CONDENSED SPECIFICATIONS

Table Working Surface	6 1/4" x 21"
Longitudinal Travel	9"
Pneumatic	5 1/8"
Cutting Stroke	10"
Hand Screw (Optional)	7"
Transverse Travel	13 1/2"
Vertical Travel — Knee	4 1/2"
Rise and Fall of Spindle	
Selective Speed Ranges up to 5000 R.P.M.	
Weight	1250 lbs.

The Semi-automatic set up with air vise on a production job. Vise operated automatically by table movement.



Write today for the Nichols general catalog, which describes the six models of Nichols Millers. A sound, color movie, "The Miller that Uses its Head" is available for free showing. May we reserve it for you?



MANUFACTURED BY W. H. NICHOLS COMPANY WALTHAM, MASSACHUSETTS

NATIONAL DISTRIBUTORS **NICHOLS-MORRIS CORPORATION**

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FORMS SMOOTH NEAT BENDS

Quick and Easy

**COSTS LESS
TO OWN
THE BEST**



View of Pines Semi-Automatic in large aluminum plant bending extruded automobile window frames. Output easily meets production line capacity.

PINES Hydraulic SEMI-AUTOMATIC BENDER

FOR PRODUCTION, SHORT-RUN AND MAINTENANCE JOBS, YOU'LL LIKE THESE PINES FEATURES

1 Simple Tooling — provides an efficient, economical method of handling a variety of work not adaptable to fully automatic equipment.

2 Safe, Dependable Accuracy — smooth, adjustable hydraulic power forms neat bends, assures uniform results, cuts scrap losses.

3 Easy to Set Up and Operate — simple tooling adjustments, easy toggle clamping, push-button operation, convenient hand wheel for angle-of-bend selection.

4 Saves Floor Space — compact, self-contained hydraulic unit includes motor, pump, reservoir. Occupies less floor space — 3' x 7'.

SPECIFICATIONS

- Std. Max. Capacity — 1" O.D. 16-ga. steel tube.
- Max. Rad. of Bend — 8 1/2" to centerline.
- Tube Lengths — up to 5 ft. std. (Provision for longer lengths if required).
- Speed — 29 rpm.
- Working Height — 35".
- Motor — 3 hp.
- Pump — 7 gpm.
- Optional — Adjustable gauges, mandrel for critical bends.

Write For More Facts...

Get full details on this dependable, economy-model Pines Bender designed to handle a variety of pipe, tube, bar, and extrusion bending work at speeds up to 300 bends per hour.

PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery

BENDING • DEBURRING • CHAMFERING • THREADING MACHINERY

690 WALNUT
AURORA • ILLINOIS

bryant

internal grinding



no. 1309-W

Finishes 2 bores and a taper straight and concentric. 2 wheelheads are used on this semi-automatic. Max. traverse stroke, 6". Max. grinding length, 3½".



no. 1109

For high production of small bores where accuracy of size and finish are required. Max. traverse stroke, 6". Max. grinding length, 3½".



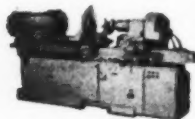
no. 2209

For precision and high production grinding of ball bearing races, gears, rolls, bushings, etc. Max. traverse stroke, 6". Max. grinding length, ¾".



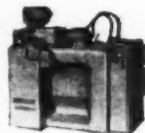
no. 1116

A general purpose hole grinder for tool room, small shop, or general production. Maximum traverse stroke, 20". Maximum grinding length, 8".



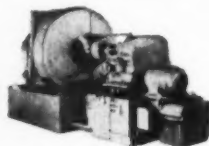
no. 1416

Specially designed for grinding bores in long work, such as machine tool spindles. Maximum traverse stroke, 20". Maximum grinding length, 8".



no. 1209

A fully automatic, high production machine for small and medium bore grinding. Max. traverse stroke, 6". Max. grinding length, 3".

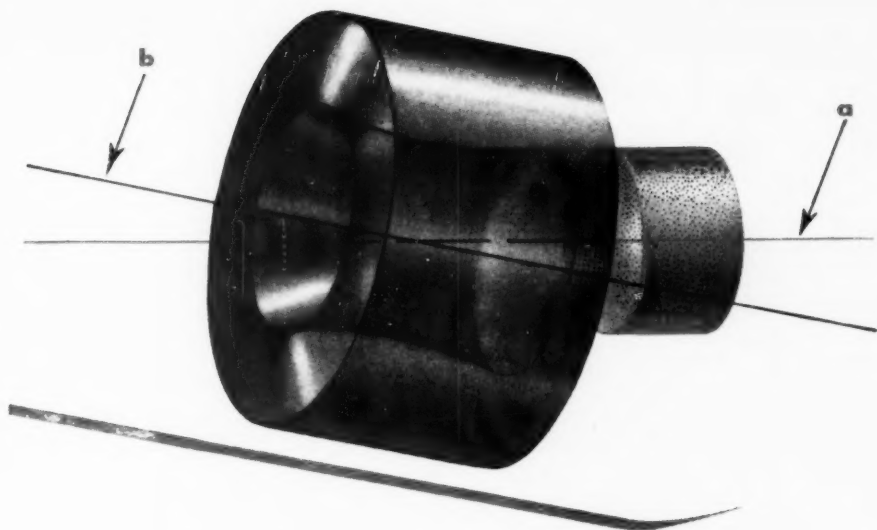


no. 1460

For production or single piece hole grinding on parts up to 60" diameter. Max. traverse stroke, 21". Max. grinding length, 16".



"Alignment for Better Internal Grinding", a new, sound color moving picture is available for free showing to engineering groups. Write for descriptive booking form.



BELL mouth holes are a common internal grinding error. General available information advises simply turning the workhead or changing the length of traverse to correct this error, to generate a straight hole. In the case illustrated above, where bell mouth exists on both ends of the hole, either turning the workhead or changing the length of stroke will improve the shape of the hole but will not correct the error. In the illustration, the work axis "b" is tipped out of alignment with wheel and wheel path axis "a". When the wheel, moving on axis "a", traverses the front of the hole, it grinds above the work center line and the front of the hole will be oversize. As the wheel traverses the center of the hole, the hole will be smaller. As the wheel traverses the back of the hole, it grinds below the center line and the hole will again be oversize. While the wheel contact may be a full line, it will not be parallel to the axis of the work.

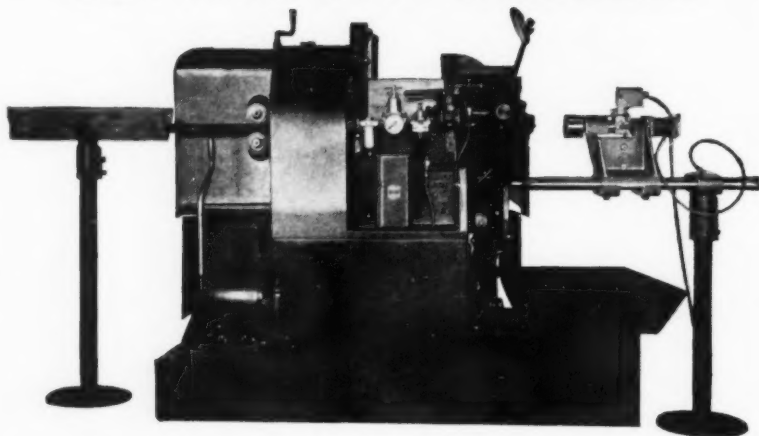
The only possible remedy is to correct the alignment of the workhead axis "b" so that it will be parallel with the wheel and wheel path axis "a". Wheel wear will be uniform but, most important, the geometry of the hole will be correct.

Bryant internal grinders are engineered to permit adjustment which will bring the workhead into proper alignment.

Bryant Chucking Grinder Company
Springfield, Vermont, U. S. A.

Internal grinders • Internal & External thread gages

The NEW MODERN AUTOMATIC CUTTING-OFF MACHINE



Cuts Off Tubing Pipe and Shafting . . . FAST

Cuts off longer pieces than a regular automatic machine. In fact, cuts off any length you want—and cuts it faster. If your production requires quantity cutting-off of tubing, pipe or shafting, check the figures below against your present time.

1/2" Tubing

This machine cuts off and chamfers both outside edges of 1/2" .030 wall tubing, 5" long at the rate of one every 2.5 seconds.

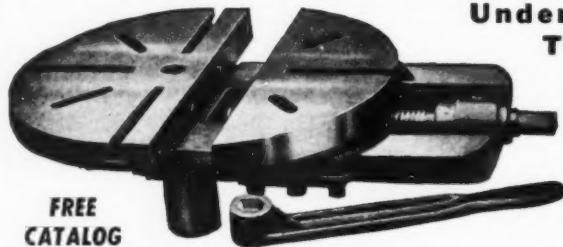
1 1/4" Cold Rolled

This machine cuts off and chamfers both ends of 1 1/4" cold rolled, 20" long, at the rate of one every 20 seconds.

1" Tubing

This machine cuts off and chamfers both outside edges of 3" long, at the rate of one every 3 seconds.

TRY THE MODERN SAFETY DRILL TABLE Under Our FREE TRIAL OFFER



**FREE
CATALOG**

Combines drill table, vise, parallels and V-block. Insures safer, faster work. We guarantee it will save its cost on labor alone in 6 months or your money back. Write for folder, with typical set-ups and specifications of all models.

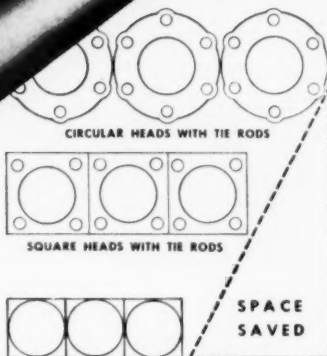
MODERN MACHINE TOOL COMPANY
Jackson, Michigan

NEW **(T-J)** Spacemaker

AIR CYLINDERS



- SAVES UP TO 40% SPACE WITH NEW STREAMLINED DESIGN.
- SUPER STRENGTH . . . EXTRA HIGH SAFETY FACTOR
- SOLID STEEL HEADS
- HEAVY WALL, PRECISION HONED, HARD CHROME PLATED, SEAMLESS STEEL BODY
- LEAKPROOF CYLINDER HEAD TO BODY CONSTRUCTION.
- RELATIVE PORT POSITIONS MAY BE ROTATED WITHOUT DISASSEMBLY OF CYLINDER AND LOCKED IN DESIRED POSITION.
- HEAVY DUTY, HI-TENSILE, HARD CHROME PLATED PISTON ROD.



T-J SPACEMAKER . . . provides additional room for adjacent equipment without sacrificing strength.

Streamlined construction of the new T-J Cylinders eliminates tie rods . . . reduces head size . . . and saves up to 40% in mounting space! In addition, a new high in strength is achieved with solid steel heads and heavy wall seamless steel body . . . leakproof construction . . . extra high safety factor.

Cylinder walls are precision honed and hard chrome plated for long-life efficiency. Available with the new T-J Super Cushion Flexible Seals which insure positive cushioning with automatic valve action for fast return stroke. Many standard sizes and styles . . . both cushioned and non-cushioned . . . for wide range of pushing, pulling, lifting, clamping or control jobs. T-J dependability. Fast delivery to meet rush requirements. Write for bulletin 8152. The Tomkins-Johnson Co., Jackson, Mich.

37 YEARS EXPERIENCE



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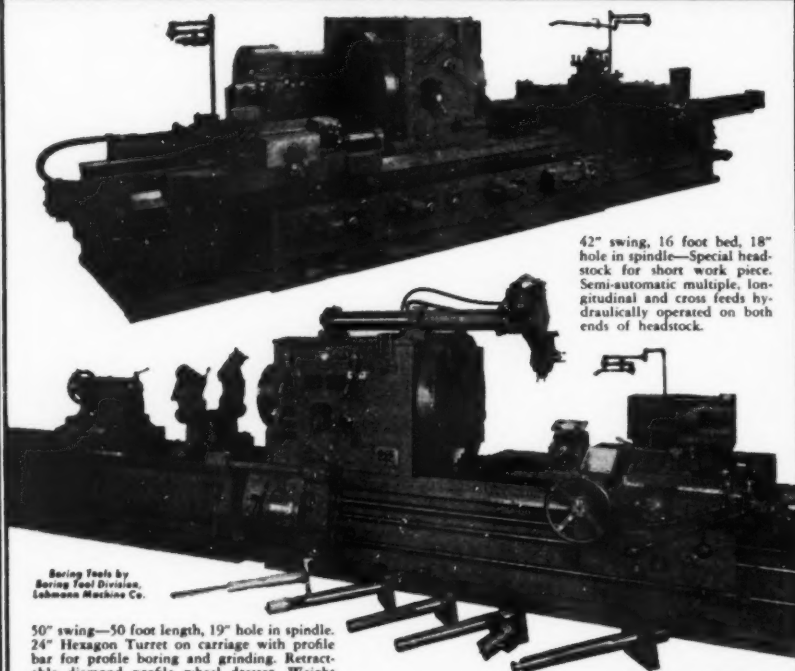
RETRACTING AIR AND HYDRAULIC CYLINDERS CUTTERS CLIMBHOES

Many More Advanced Features!

DOUBLE **LARGE HOLE** ENDER

LEHMANN *Hydratrol* LATHES

LARGE HOLLOW SPINDLE — DOUBLE END TYPE



Boring Tools by
Boring Tool Division,
Lehmann Machine Co.

50" swing—50 foot length, 19" hole in spindle.
24" Hexagon Turret on carriage with profile
bar for profile boring and grinding. Retractable
diamond profile wheel dresser. Weight
72,000 lbs.

Double End Hydratrol Lathes are built in sizes
from 18" with holes up to 7½" to larger sizes
with holes to suit the job. Double End operations
avoid necessity for resetting the work,
and insure relative concentricity of boring and
turning operations and squareness of faces
at both ends.

42" swing, 16 foot bed, 18"
hole in spindle—Special head-
stock for short work piece.
Semi-automatic multiple, longi-
tudinal and cross feeds hy-
draulically operated on both
ends of headstock.

Lehmann Machine Co.
DIVISION OF NOVO ENGINE CO.
CHOUTEAU AT GRAND
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WELDER'S TRUCK

Item
B-218



BARREL and BOX SKID

Item
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CONSULT

FOR THE BEST

PS Materials

Handling Equipment



SHEET STEEL GRAB

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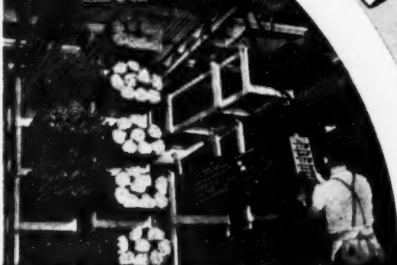
Vertical DRUM LIFTER

Item C-465
\$30.25

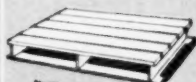
For handling open and closed steel drums in vertical position, by crane or hoist. All-steel, with heavily welded chain. Sure-hold safety barrel grip. Saves plant space. Use for either high or low ceiling condition.

PORTABLE Heavy Duty BAR RACKS
Any Rack Easily Accessible

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Item
B-205



All metal PALLET

Item
B-539



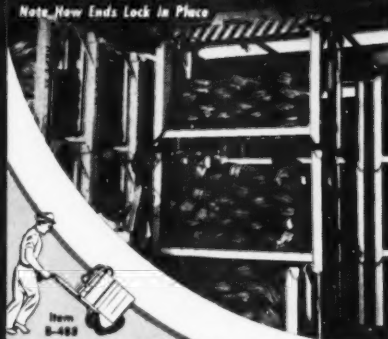
AIR SAVER leak proof AIR VALVE

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S-997.5

STACKING RACK

Tiered by Single Operator.
Note: New Ends Lock in Place

Item C-496



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\$181.50



DRUM and BARREL TILT

A barrel tilt for controlled, precision dumping or pouring. Ideal for chemicals, solvents, powders, etc. Turns 360° through worm drive. Equipped with two safety type locking devices and all-steel, welded yoke. Hand-operated chain drive.



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B-488



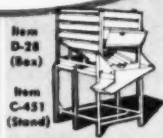
CORE RACK

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S-918



UTILITIES RACK on wheels

Item
NS-415



Sloped Bottom BOX and STAND

Item
D-28 (Box)
Item
C-451 (Stand)



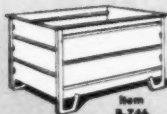
BARREL TRUCK loads automatically

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S-911



MULTI-PURPOSE CART

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B-291



CORRUGATED BOX with legs

Item
B-746



TRAILER TRUCK side dump

Item
B-360

WHEN ORDERING always give "Item" number. ALL PRICES are f. o. b. Detroit. Prices are subject to change without notice. Write for Catalog.

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Palmer Shile Co.

16021 FULLERTON AVE., DETROIT 27, MICH.

VALUABLE EQUIPMENT IN ANY SHOP



HEAVY DUTY CHALLENGE WORK BENCHES



Challenge Work Bench
featuring tool box shelf
and steel drawer
with lock.



Challenge Work Bench
with tool box shelf.



Challenge Work Bench
without shelf or drawer.

Whatever your requirements may be — there is a Challenge work bench to meet your needs. Each has a durable cast-iron top two inches thick — will not warp, shrink, splinter or burn. And every one has leveling screws to insure a perfectly level and accurate surface. Legs are strong and solidly braced.

A COMPLETE RANGE OF SIZES AND STYLES

Three styles as shown . . . Four sizes: (top dimensions) 28x48 and 28x60 with four legs; 28x72 and 28x84 with six legs. Write for details and prices.

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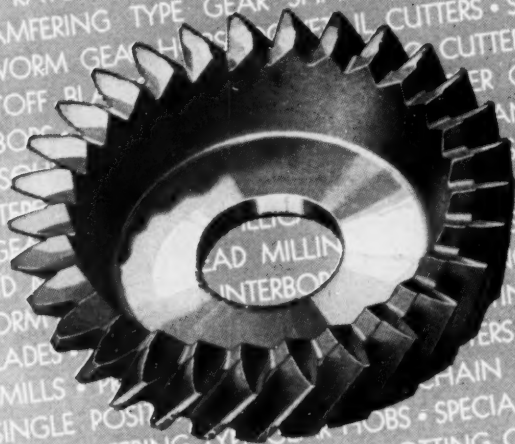
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THE CHALLENGE MACHINERY COMPANY

Office, Factories and Show Room:
GRAND HAVEN, MICHIGAN

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... DEPEND ON

National Tool Co.



● Years of successful experience in *special* tooling and related production problems are yours for the asking. When the job requires *special* cutting tools call in your National Tool Co. representative. He is backed by more than 46 years experience in the engineering and manufacture of *special* cutting tools. His assistance is yours, without obligation, whether you're interested in one tool or a complete tooling program.

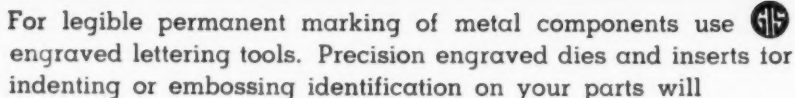
Representatives in major industrial centers.

Since 1905 engineers and manufacturers of high-quality special cutting tools for the metal-working industry

National

TOOL CO.

Cleveland 2, Ohio



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- **Numbering Heads**
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2. Advertise throughout life of part.
3. Facilitate reordering.

Write for free catalog on Production Marking Equipment.

GEO. T. SCHMIDT, INC.

**1802 Belle Plaine Avenue
Chicago 13, Illinois**

Removes 14% more metal with **ROTOR CHIPPERS**



THIS steel mill tried Rotor C-30 Powerplus Chippers for 3 months and proved their superiority by time studies which showed 14% more metal removed from 45 to 55 carbon shell stock than with former hammers. Operators say they like them better too—they're shorter, lighter, and they handle easier.

Put these new Rotor Chippers to the test on your operations! Ask for a demonstration or trial. No obligation. Write for free copy of Catalog 37.

ROTOR CHIPPER FACTS

LIGHTER . . . 1½ to 3 lbs.
less than other chippers.

SHORTER . . . 1" to 2" shorter
. . . easier to get into
crowded corners.

MATCH YOUR JOB . . . Each
basic model can be adapted
to three kinds of work.



THE **ROTOR TOOL** CO.
CLEVELAND, OHIO





UNPARALLELED GRIP from parallel jaws

Latest And Greatest In Collet Design! Tool engineers and machine tool builders praise the Jacobs Rubber-Flex Collet as one of the outstanding developments in modern tool history. This new principle of collet construction brings you not only great improvements in gripping power, accuracy, and service life, but — *for the first time* — a collet with a full $\frac{1}{4}$ inch capacity range.

The Jacobs Manufacturing Company, West Hartford 10, Conn.



IF IT'S A **JACOBS** IT HOLDS

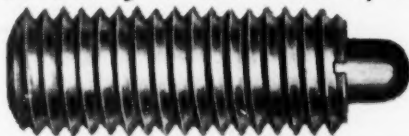
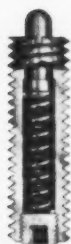
**Jacobs and your
local distributor**

are ready to deliver the chucks you
need and the service you deserve.

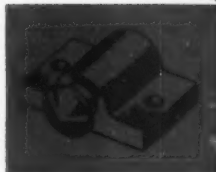
... **first in chucks**
... **first in service**

VLIER Spring Plungers and Stops

Save You Money in Hundreds of Ways



Here are the perfect units for replacing "make-shift" plungers in production and for end product use. Widely used for positioning small parts in fixtures, breaking oil seal in dies, as a locating pin, detents, etc. These units have long life and give trouble-free performance. Economically priced. There is a nearby Vlier distributor to serve you. Write for catalog No. 57 today.



Completely assembled units, available in 17 sizes.

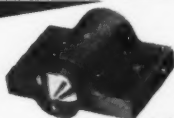


Pre-set, constant (1-42 lbs.) spring pressures. National Coarse Thread No. 1 fit.

Hardened plungers and rust-proof finishes give long life.



True plunger alignment in all positions. Fully telescoping.



SPRING STOPS

For use where fixture design prevents the mounting of spring plungers. Body is jig-drilled for bolting to fixture-base. Has case-hardened, radiused nose. Available in two sizes with 14 or 32 lbs. spring pressure.



**VLIER
ENGINEERING, INC.**

4552 BEVERLY BLVD., LOS ANGELES 4, CALIF.

Distributors of Torque Thumb Screws,
Toggle Pads, Fixture Keys

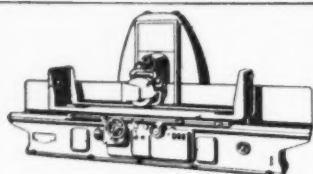
MATTISON GRINDERS

*If its a Flat Surface to Grind
There's a Mattison to Grind it.*

• Mattison now is in a position to work with you on all your surface, face and disc grinding problems. These machines are made in various types to handle a wide range of work. Experienced fixture engineers are available to give you best production efficiency with Mattison Machines.

For any flat grinding, ask for our recommendations on the proper method and machine for your job. No obligation, of course.

For catalog on all machines, ask for free copy of general bulletin.



Precision Surface Grinders
Horizontal Spindle



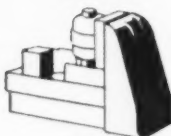
Disc Grinders,
Double Spindle Type



Vertical Spindle
Disc Grinders



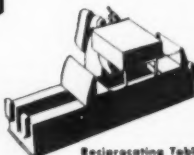
Plane Grinders,
Rotary Table Type



Rotary Table
Surface Grinders



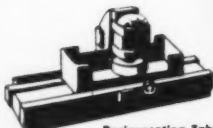
Automatic Rotary
Surface Grinders



Reciprocating Table
Face Grinders



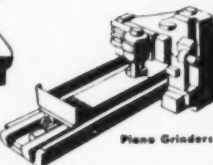
Disc Grinders,
Single Spindle Type



Reciprocating Table
Surface Grinders
Vertical Spindle



Face Grinders,
Traveling Wheel



Plane Grinders

MATTISON

ROCKFORD • ILLINOIS

MACHINE WORKS



40 hours before — now 4 hours. Pump case ground on Mattison Horizontal Spindle Precision Surface Grinder



320 surfaces of cast iron compression heads per hour, removing 1/32" stock with Mattison No. 24 Rotary Surface Grinder



900 connecting rods per hour, using 40 station fixture to finish grind crank and screw pin end of assembled rod with Mattison No. 72 Grinder



Shows variety of work run on Mattison Face Grinders

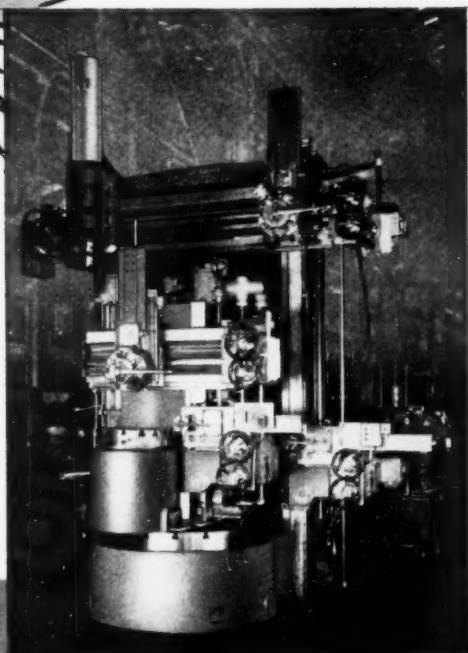
The Small and the **LARGE...**

CUT MASTER

VERTICAL TURRET LATHES

Six specific sizes 30-36-42-54-64 and 74 inch with extra high beds when required.

Shown here is the 30 inch machine comfortably nestling on the table of a 74 inch high bed machine. There was no fear of spindle bearing damage or bed deflection even with this 26,000 lb. load. Proof of confidence in the rugged construction of Bullard Cut Masters.



YOUR... REQUIREMENTS

Heavy work on Cut Masters is no exception even on the smaller sizes. Rigid castings and heavy construction combined with rugged and accurate spindle design throughout the entire line provide for exceptional cutting loads with a high degree of repetitive accuracy.

Flexibility of tooling, assures efficient change-over from one job to another. Effective controls provide accurate duplication of limits on quantity production.

All-in-all machine tool versatility and a wide range of sizes and capacities place these machines as a factor in your manufacturing efficiency program.

...CONSIDER... INVESTIGATE



MACHINE TOOLS

**TIME SAVED
IS MONEY EARNED**

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

CUT COSTS... FASTEN "ON THE DOUBLE"

with the

Chicago

"214" DOUBLE RIVET SETTER



The "214" automatically feeds, inserts and clinches two rivets at a time . . . with speed that may mean a big saving in your fastening costs. 14" throat makes large assemblies easy to handle. For up to 9/64" diameter steel rivets—lengths to 7/8". Quick Change Rotary Type Hoppers and Raceways permit 5-minute changeover to rivets of different size. Adjustable anvils and riveting centers add to its versatility. Ask us how the "214" can help you cut costs. Send a sample of problem assembly (or blue print) for Free fastening analysis.

FREE CATALOG

contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.

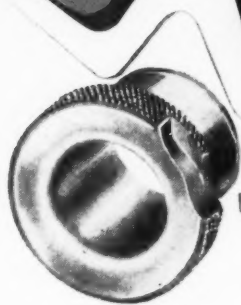
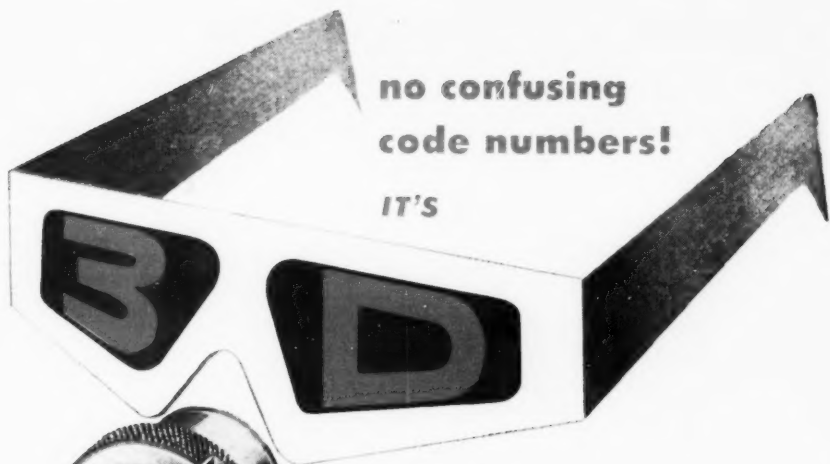
Chicago Rivet & MACHINE CO.

9610 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois

Branch Factory: Tyrone, Pa.

no confusing
code numbers!

IT'S



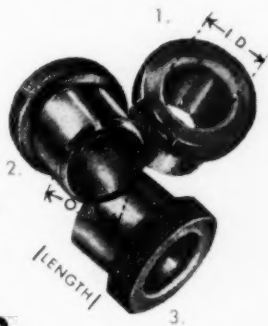
WITH

American

It's not new! For years American has used 3-D to simplify ordering drill bushings. American's original three dimension ordering plan; 1-I.D., 2-O.D., and 3-length, eliminates confusing code numbers...saves time, trouble!

Fully stocked distributors located in every major area throughout the U. S. You can get the right drill jig bushing when you want it!

Order American Drill Bushings the 3-D way... send for the new catalog with the KING SIZE selection of standard sizes.



AMERICAN DRILL BUSHING CO.

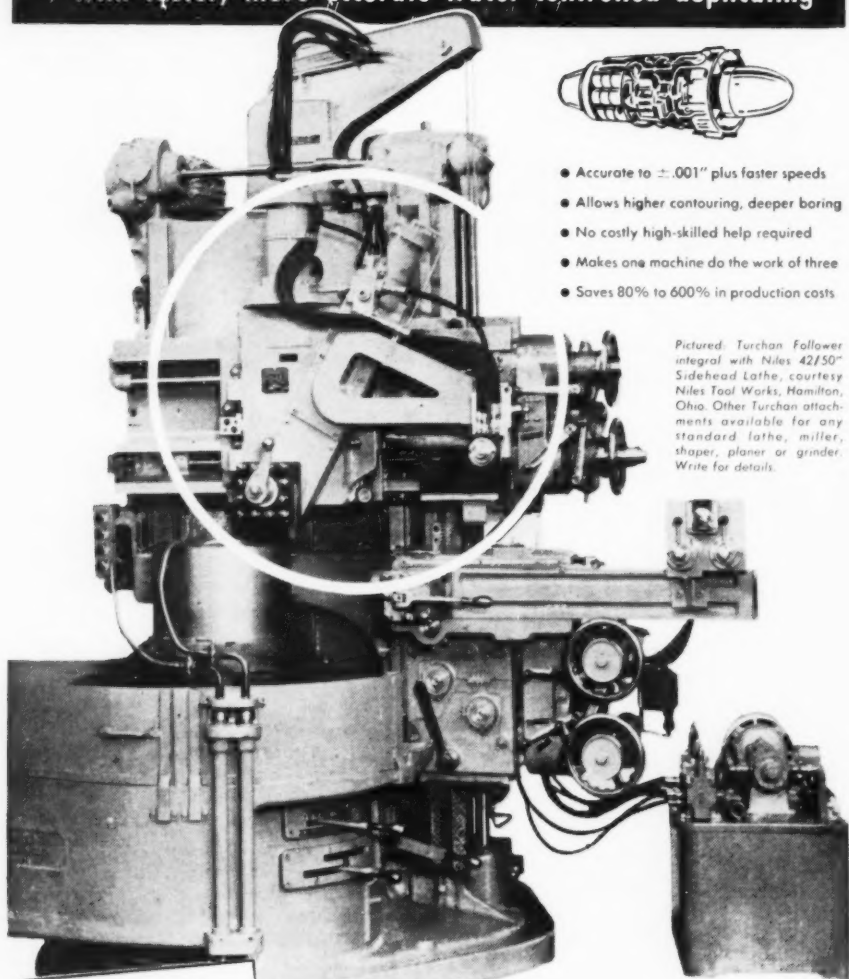
5107 Pacific Blvd., Los Angeles 58, Calif.

TRADEMARK



SPECIALIZING ONLY IN DRILL JIG BUSHINGS

Turchan and **NILES** meet demands of JET work
with faster, more accurate tracer-controlled duplicating



- Accurate to $\pm .001$ " plus faster speeds
- Allows higher contouring, deeper boring
- No costly high-skilled help required
- Makes one machine do the work of three
- Saves 80% to 600% in production costs

*Pictured: Turchan Follower
integral with Niles 42/50"
Sidehead Lathe, courtesy
Niles Tool Works, Hamilton,
Ohio. Other Turchan attach-
ments available for any
standard lathe, miller,
shaper, planer or grinder.
Write for details.*

GET AN ESTIMATE

Overcome your shortage of
skilled manpower—send a
sketch and specifications
of any job for an estimate.

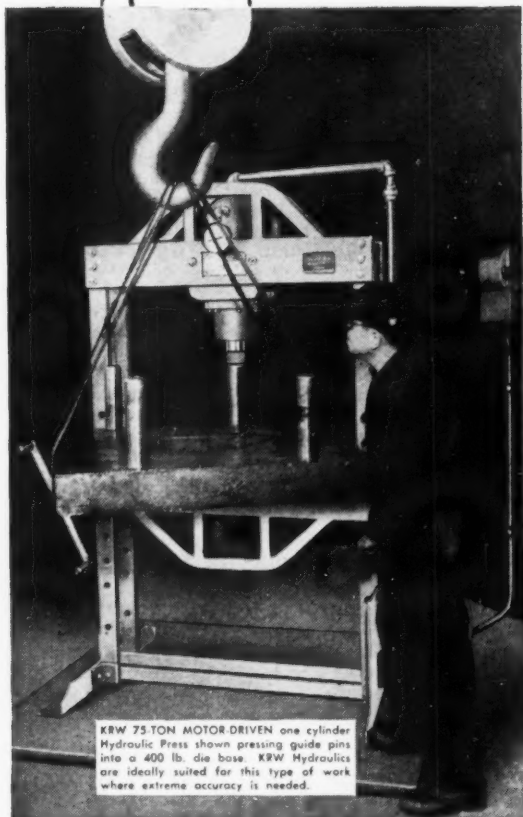
OLDEST MANUFACTURER OF AUTOMATIC TRACER-CONTROLLED EQUIPMENT

Turchan FOLLOWER MACHINE CO.
8259 LIVERNOIS AVE · DETROIT 4, MICHIGAN

KRW PRESS

Does its daily dozen

... and big ones like this are just routine!



KRW 75-TON MOTOR-DRIVEN one cylinder Hydraulic Press shown pressing guide pins into a 400 lb. die base. KRW Hydraulics are ideally suited for this type of work where extreme accuracy is needed.

That's a 400 pound die base in the KRW Hydraulic Press at left. Offhand you might think that it's biting off more than it can chew. But not this press! It's been doing a dozen jobs like this **daily** for two years.

The Press is used in the Specialty Shop of a large steel company which makes everything from ornamental iron railings to end "spiders" for lawn mowers. It does a wide variety of jobs such as pressing pins in bearings, straightening bent roll shafts, pressing die shanks into punch holders and compressing springs on die strippers before dismantling dies — an important safety feature in this Shop.

LOOK AROUND YOUR SHOP!

You'll probably find several jobs that could be done faster, more easily with a KRW Hydraulic. They're amazingly versatile and their cost is surprisingly low. 25-150 ton capacities; one, two and three cylinder models; hand operated, air operated or motor driven. If you need a special Press we'll design and build it for you.

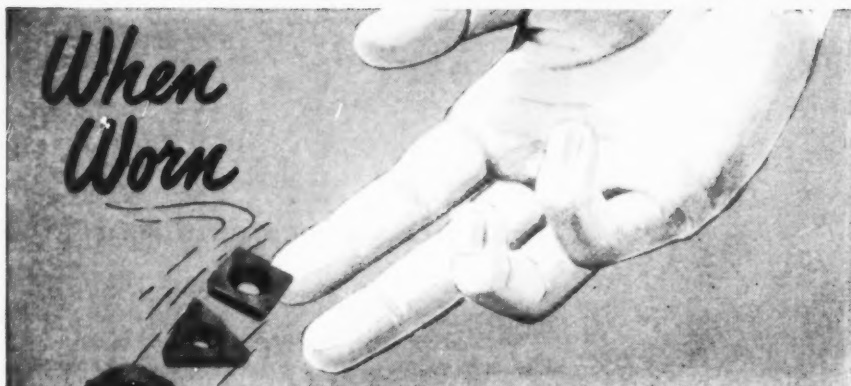
Write Dep't. 13 for specifications and prices.

K·R·WILSON

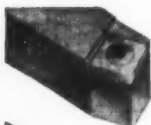
215 MAIN ST., BUFFALO 3, N. Y.



Designers and Builders of the Right Hydraulic Press to Solve Your Metal-working Problems!



THROW THEM AWAY ... and Save Money



Style 12SKD



Style 6RKD



Style 6TKD



Regrinding of carbide tools—even the best—consumes time and money. It can be a major item in over-all tooling costs. But—there's a way to eliminate this expense entirely on many jobs. Here's how.

The "Kendex" tool needs no regrinding! It has an indexable insert that can be discarded when all its multiple cutting edges become dull.

By the time replacement is required (at slight cost compared to that of regrinds), the insert has already paid for itself by increased productivity, and to discard it is economical practice.

Kendex tools are available in three styles—with round, square, or triangular inserts—as illustrated, and in a range of shank sizes— $\frac{1}{2}$ " to 1" square.

Perhaps you have jobs on which standard Kendex tools will be suitable—or you may be able to use the standard inserts in conjunction with present tooling. If you desire, one of our Tool Engineers will be glad to assist in working out suitable applications of the "Kendex"* principle to your specific machining problems. Kennametal Inc., Latrobe, Pa.

*KENDEX®

KENNAMETAL

CEMENTED CARBIDE TOOLING
THAT INCREASES PRODUCTIVITY



For those... **UNUSUAL TAPPING OPERATIONS**

USE **SJ** SCULLY-JONES

HEAVY DUTY TAP HOLDERS *and* **CLOSE CENTER TAP DRIVERS**

EASY TO HOLD AND DRIVE LARGE TAPS

These rugged, one-piece tap holders are widely used in radial drills, drill presses, turret lathes, horizontal boring mills and similar machines for heavy duty tapping operations.

The thick body wall takes a lot of punishment, yet is not oversize in relation to spindle diameter. Hole and shank are concentric within .002". The hole centers the shank of the tap, and a broached square furnishes a positive drive.

SCULLY-JONES
HEAVY DUTY
TAP HOLDERS

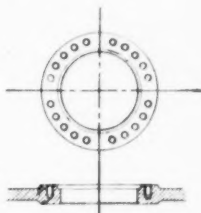


MAXIMUM CLEARANCE BETWEEN CENTERS

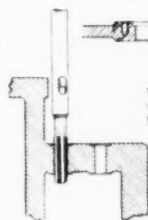
When tapping holes close together or near a shoulder, the S-J Close Center Tap Drivers will do the job. As they are smaller in diameter than machine spindles, they provide maximum clearance between centers.

The hardened, splined section furnishes a positive drive for the square of the tap. Collet action of the split bushing on shank of tap reduces strain and cuts down tap breakage. As the tap works harder, bushing grips shank tighter. Three series—short, medium and long.

SCULLY-JONES
CLOSE CENTER
TAP DRIVER



Typical tapping operations
which are no problem with
S-J Close Center Tap Drivers.



Write for Bulletin No. 4-30

on Scully Jones Tap Holders and Drivers
Shows complete range of sizes, specifications and prices.

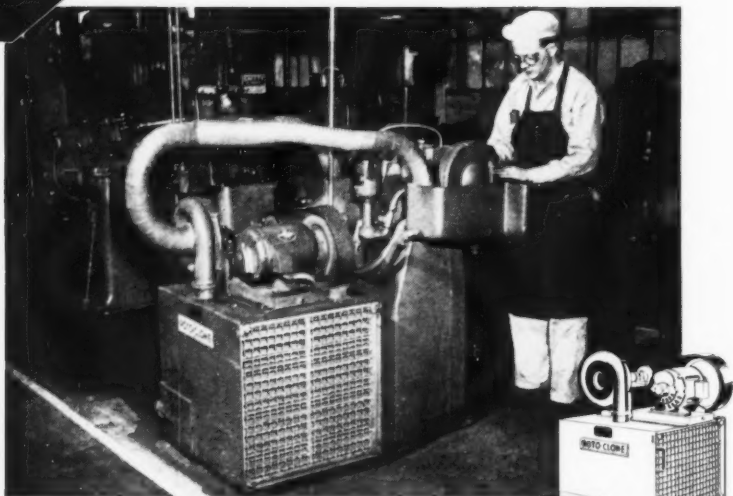
Scully-Jones
AND COMPANY

1907 S. ROCKWELL ST. CHICAGO 8, ILLINOIS

YOU GET LOW COST, FAST, ACCURATE PRODUCTION WITH OUR STANDARD AND SPECIAL TOOLS

STOP

Tool-Room Sabotage!



ROTO-CLONE Dust Control Helps Maintain Machine Tool Accuracy—Reduce Repairs

Those precision machines in your tool room are their own worst enemies. Cutter, surface and hob grinders, lathes, drill presses, automatic machines—all are prime dust makers. And, when this self-made dust "comes home to roost", so do your troubles in the form of excessive parts wear, inability to maintain close tolerances, and costly repairs.

Scores of tool rooms have cleaned house and cut costs with Self-Contained Type D ROTO-CLONES. This complete, compact unit exhausts and separates the fine, abra-

sive dust; stores the collected material for convenient disposal; and filters the air before returning it to workroom. Perfect for tool rooms that, for reasons of size or layout, cannot justify a central system of dust control. Just spot 'em where you need 'em—and watch your dust problems disappear.

A call to your local AAF representative or letter to us direct will bring you complete data on this Self-Contained ROTO-CLONE Unit. For the sake of more efficient tool-room operation, do it now!

American Air Filter

COMPANY, INC.

312 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.



"Buffalo"

Tips on Metal Bending

PROBLEM: Bend commercially perfect circles, arcs or spirals at a profitable production speed from any of these standard sections:

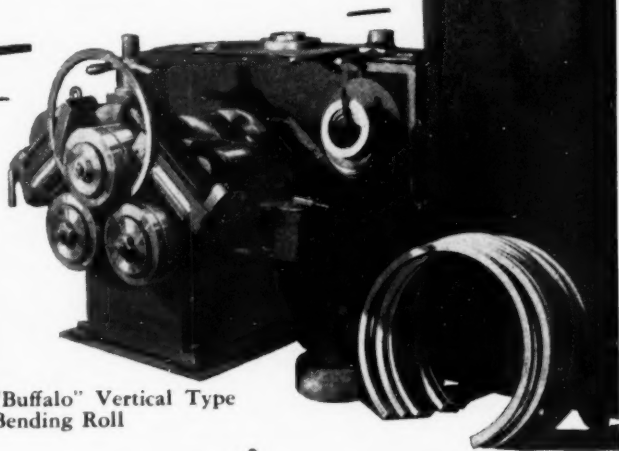
- | | |
|--------------------------------|-----------------------|
| 1. Angles, leg-out | 7. Rounds |
| 2. Angles, leg-in | 8. Squares |
| 3. Beams on flanges | 9. Copper tubes |
| 4. Channels, flanges in or out | 10. Standard St. pipe |
| 5. Flats on edge | 11. X heavy pipe |
| 6. Flats on flat | 12. XX heavy pipe |

SOLUTION: Use a "Buffalo" Bending Roll. It handles all these jobs and more, faster and cheaper than any other method.

"Buffalo"

BENDING ROLLS CAN SAVE YOU MONEY!

Why not write for Bulletins 3344-A and 352-B today?



"Buffalo" Vertical Type Bending Roll

BUFFALO FORGE COMPANY

161 Mortimer St.

Buffalo, New York

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING

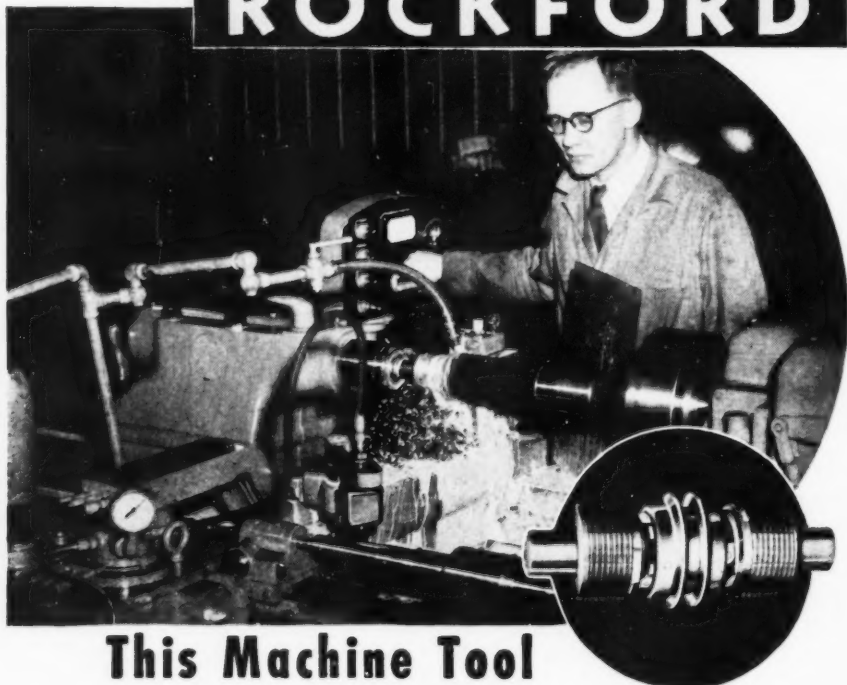
PUNCHING

CUTTING

SHEARING

BENDING

CLUTCHES by ROCKFORD



This Machine Tool "Feels" It's Way

The Monarch "Air-Gage Tracer" machines different diameters, tapers, bevels, forms, grooves, undercuts, shoulders, necks and chamfers in a single, continuous operation — duplicating the template form within exceedingly close limits. A ROCKFORD Pullmore CLUTCH serves as a brake in the headstock. Let ROCKFORD clutch engineers help your designers develop highly accurate power transmission control for your machines.

Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications.

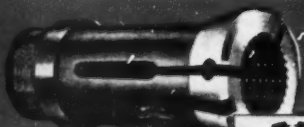


Furnishes capacity tables, dimensions and complete specifications.

ROCKFORD CLUTCH DIVISION BORG-WARNER

1309 Eighteenth Avenue, Rockford, Illinois, U. S. A.

**ALL SHEFFER STANDARD COLLETS
HAVE SHEFFER CLOVER-LEAF GRIND**



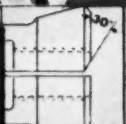
Depressed grind at slit assures better collet action. Standard on all sizes and designs for all automatics, lathes, mills, etc. Special collets to your prints.



**ONLY SHEFFER BUILDS THE
SHEFFER SELF-CLEANING COLLET***

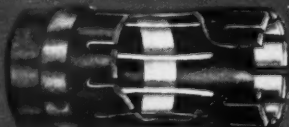


Inclined planes throw coolant, sludge, chips away from slits. Proved highly efficient in preventing travel of sludge back to mechanism. Reduces down-time.



SHEFFER PRODUCTS ARE BEST

**SHEFFER "ECONOMY" PUSHER
GIVES MORE PIECES PER BAR**



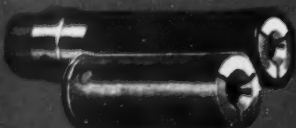
Dual bearings for positive grip with less pressure. Gives more pieces per bar. Available in solid bronze for soft finished surfaces. Also conventional and "squirrel cage" pushers.



**SHEFFER
DIAPHRAGM
CHUCK STEPS UP
GRIPPING POWER
8 TIMES***

Simple booster mechanism multiplies air thrust. Permits stiffer diaphragm giving tighter jaw grip and wider application. Repeats to extreme accuracy. Designs for special applications.

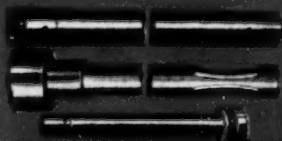
**SHEFFER "BB" PUSHER HAS
SIMPLE ONE-PIECE INSERT**



Single insert holds stock in most cases to full rated capacity. Reduces stress and wear. Easy to stock and assemble. Made in several materials. Also available with 3-piece pods.

*Patent applied for

**SHEFFER HAS COMPLETE LINE
OF SCREW MACHINE ACCESSORIES**



Collet tubes and pushers, tubes with spools, etc., collet tube adjusting nuts, pusher tube bushings for all automatic screw machines.

Write for our catalog

**MEET THE DEMAND FOR PRECISION
WITH TOOLS THAT MAKE PRECISION EASY**

SHEFFER COLLET CO.

TRAVERSE CITY, MICH.

SANFORD BENCH SURFACE GRINDER MODEL SG

for Wet* or Dry Grinding!

PRECISION • SPEED • SENSITIVITY

A low cost, precision machine for surface grinding dies, instrument parts, gauges and other small parts which would fit in the palm of the hand.

By using Sanford Bench Grinders many manufacturers of precision machinery have drastically cut over-all costs for finishing small intricate parts. This releases large, more expensive machines for heavier duty work.

The Sanford SG is the only low cost Bench Surface Grinder that

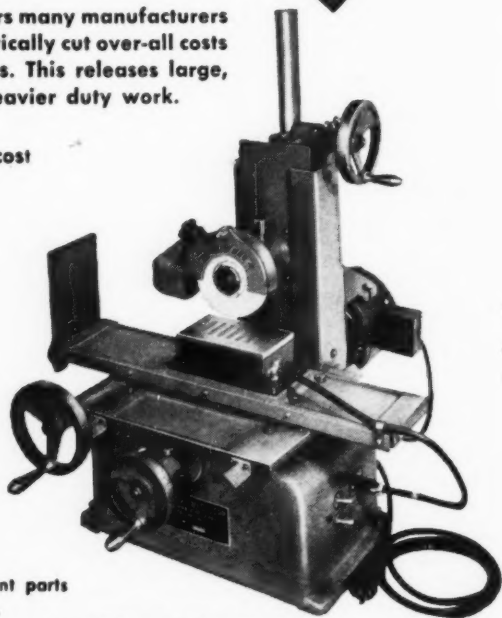
- Grinds to less than .0001" tolerances
- Operates without vibration
- Assures long life because Meehanite castings are used in its construction

SPECIFICATIONS—4" traverse
—8" longitudinal—6" vertical
under 4" wheel. Approximate
weight 160 lbs.

Complete details are included
in illustrated bulletin.

Send for your copy today.

Reconditioning facilities, replacement parts
and special attachments are available.
Send for price list.



*With optional equipment

SANFORD MANUFACTURING CORP.
1026 Commerce Ave., Union, N. J.

1½ MICROINCH FINISH RMS

At Less Cost!

Today Size Control Centerless Lapping Machines are:

- ✓ Providing finishes of 1½ microinches or less and tolerances of .000005
- ✓ Lapping oversize bearings and gears
- ✓ Lapping and sizing bearing races, bushings, shafts and cylindrical parts

How They Are Saving Money for People Like You:

- ✓ Salvaging worn gages by reducing to next lowest size
- ✓ Saving shop space—dimensions are only 38" wide, 24" deep, 36" high
- ✓ Special operating skills, costly set-ups, ring laps, special tools, not needed

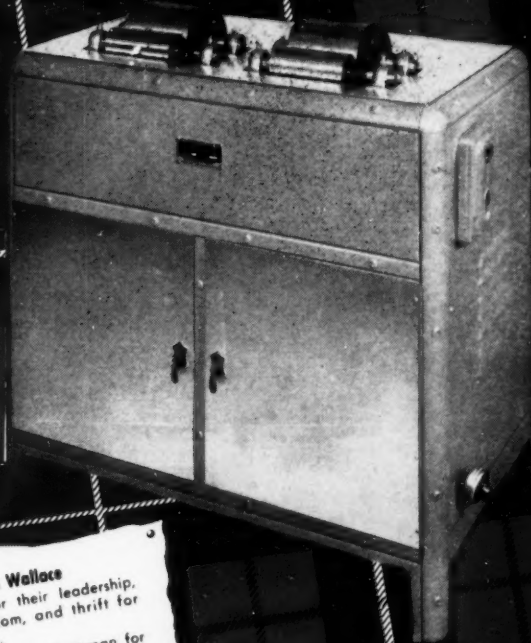
Prices Are Right:

- ✓ Model 100 . . . \$775.00 complete
- ✓ Model 200 (illustrated) . . . \$995.00 complete

Availability:

- ✓ 24 hours

May we have your order?
Phone, wire (collect), or
write today.



Tarton of clan Wallace
... famous for their leadership,
practical wisdom, and thrift for
over 800 years.
You can be a canny Scotsman for
your business, too. Investigate, con-
sider, and buy your Size Control
Centerless Lapping Machine.

SIZE CONTROL COMPANY

2306 West Washington Boulevard • Chicago 12, Illinois • MOntree 6-6710

Division of AMERICAN GAGE and MACHINE COMPANY

SIMPSON ELECTRIC COMPANY

5280 West Kinzie Street
Chicago 44, Illinois ES1rebrook 9-1121

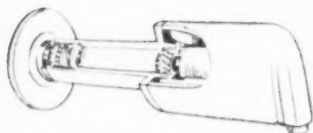
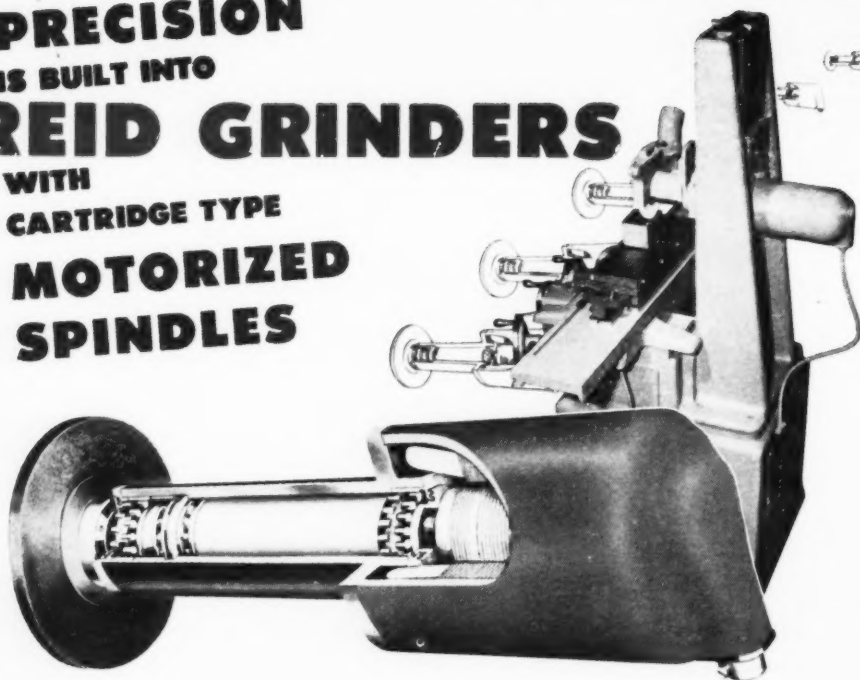
SIZE CONTROL COMPANY

2306 West Washington Boulevard
Chicago 12, Illinois MOntree 6-6710







WALSH PRESS & DIE COMPANY

4709 West Kinzie Street
Chicago 44, Illinois ES1rebrook 8-6700

PRECISION IS BUILT INTO REID GRINDERS WITH CARTRIDGE TYPE MOTORIZED SPINDLES



When tolerances call for plus or minus a ten thousandth, you can rely on a Reid Precision Surface Grinder. Every Reid is equipped with a precision spindle, running on pre-loaded roller bearings and dynamically balanced to revolve with exact accuracy at peak loads. Sealed-in lubrication of bearings and motor *keeps* these spindles performing with a minimum of attention, year after year.

-  Standard-size, interchangeable within minutes
-  Wheel guard with hinged cover allows quick wheel change
-  Adjustable dust guard spout to suit thickness of work being ground
-  Extra rigidity eliminates chatter — increases production
-  Sealed-in lubrication protects bearings from dust and dirt — reduces friction for cool running
-  For jobs requiring the spindle in vertical position, a special bracket, furnished by Reid, is all that is necessary for conversion

Cartridge type motorized spindles with 3" diameter quills, as manufactured by: Pope, Ex-Cell-O, Whitnion and Parker may be used with Reid Grinders.

Reid Precision Grinders

(the result of 53 years of experience) will improve the quality and capacity of *your* shop. Find out why Reid is the choice of industry for precision grinding.

Write for Bulletin 618-6

Reid Brothers



Company, Inc.

BEVERLY, MASSACHUSETTS

5

MACHINES**in ONE!**

Planing
Milling
Drilling
Boring
Surface
Grinding



The above Universal Planing Machine (Model BB) combines the operations of 5 conventional machines. It has a table length of 108 in., 3 milling machine attachments and 3 slide supports.

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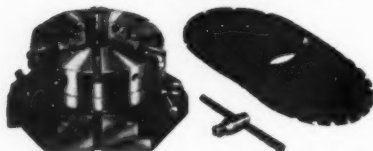
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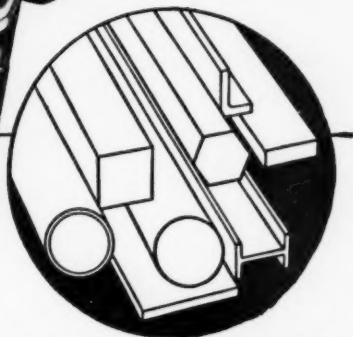


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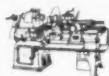
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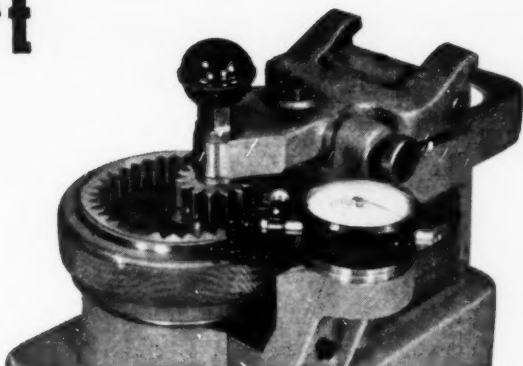
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Catalog
and
Handbook
No. 35

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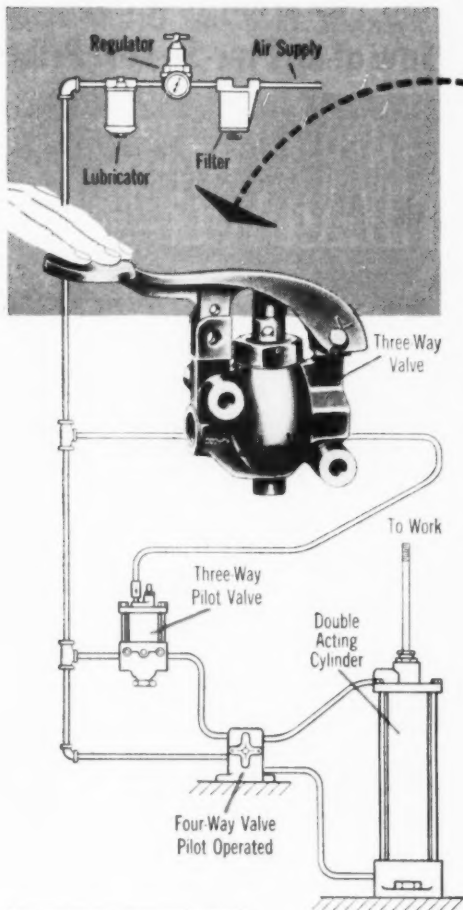
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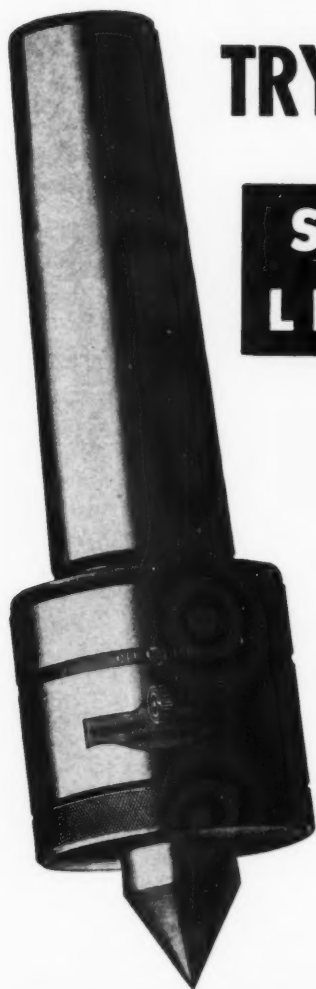


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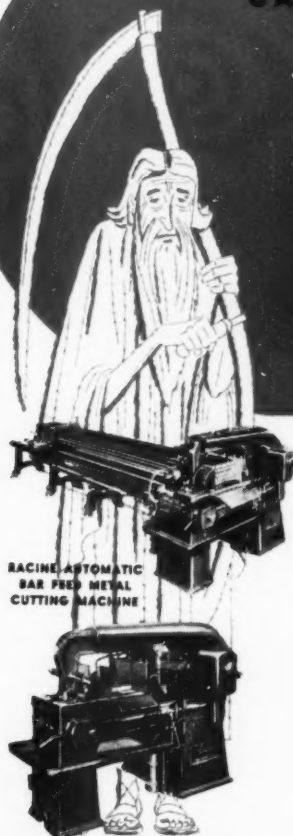
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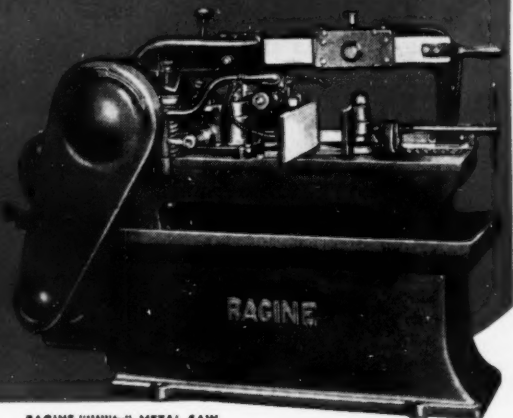
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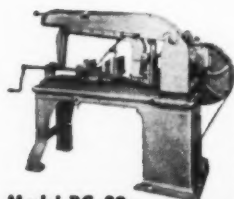
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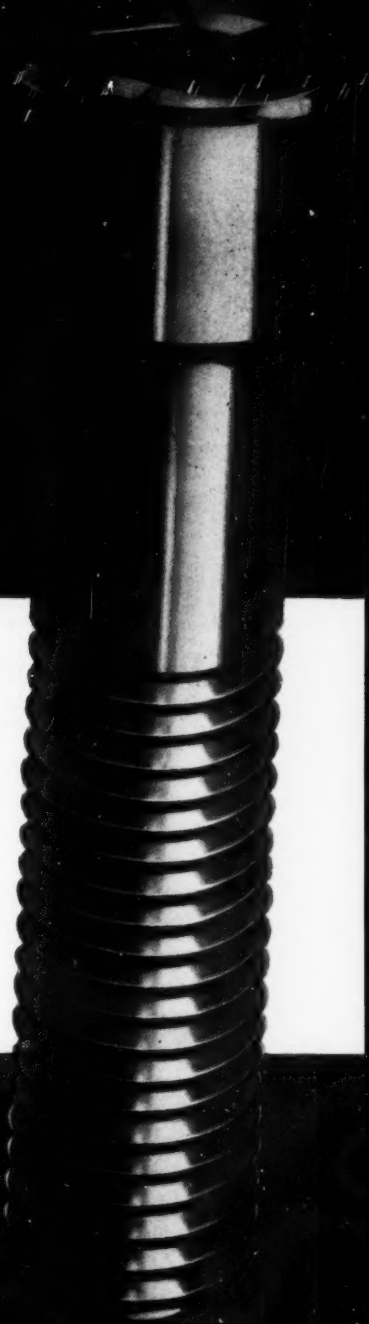
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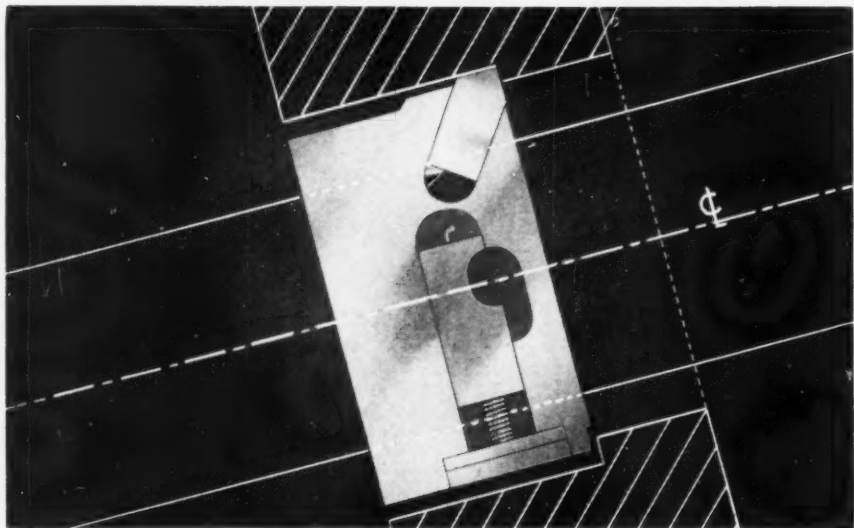


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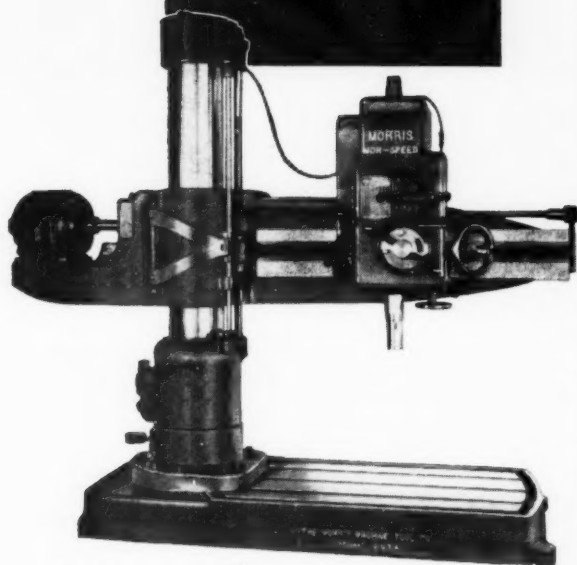
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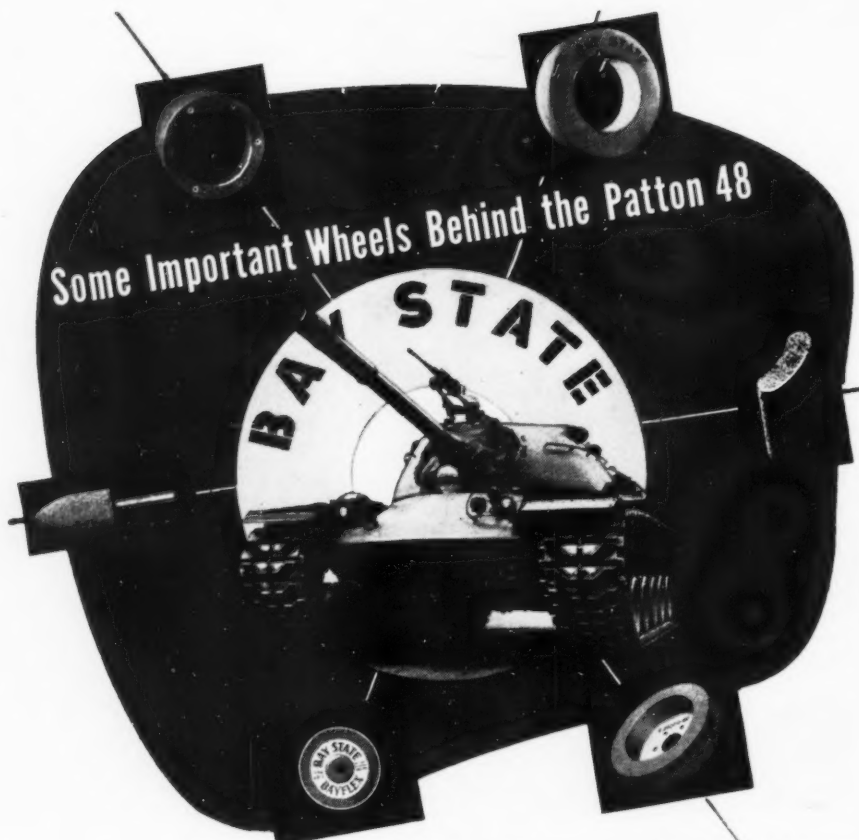


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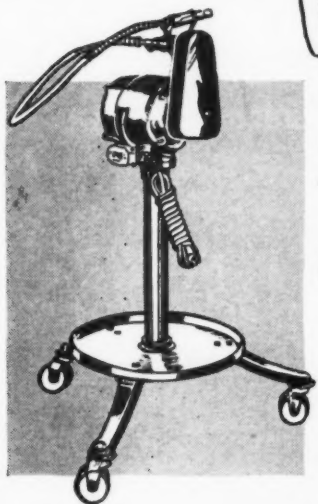
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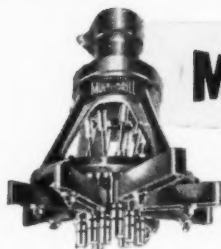
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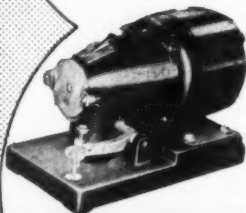
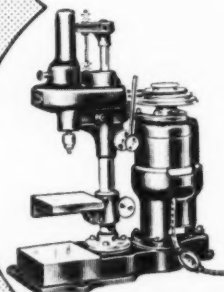
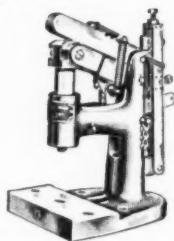
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Featured **IN THIS ISSUE**

Metal-working Plant Squeezes "Juice" from Scrap—	
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Carbide Milling of Steel Components, by Herman Reichardt. This is another in a series of milling machine operations analyzed by Reichardt. A number of these have appeared in past issues of the BLUE BOOK. Page155

Why . . . Where . . . How . . . Dust Control in Metalworking Shops, by James R. Kayse, supervising engineer. Short circuiting of electrical equipment, excessive wear on machine tools, additional housekeeping, poor labor relations and in some cases health hazards are a few of the results of inadequate dust control in a metalworking shop. The success of any industrial exhaust system is proportional to the effectiveness of the exhaust hoods and proper selection of necessary air volumes. Page160

Metalworking Plant Squeezes "Juice" from Scrap—Operation Returns a Profit, by James Joseph. The old argument, whether machine shops should bother with metal chips or whether tailing from lathes, etc., should be plant processed, comes to a head here. Parker Aircraft, Los Angeles, with a weekly scrap production of 50,000 lbs., says "wring them out!" By squeezing out the aluminum and steel chips and recovering the oil this West Coast manufacturer has found it profitable; centrifuges salvage about eight gallons of oil from each 500 lb. batch of steel chips, with ten batches handled daily. Page170

How to Increase the Efficiency of Lathe Steady-Rests, by Clifford T. Bower. The lathe steady-rest, three point, is basically similar in design to what it was 70 years ago. Some efficient rests have been developed, yet most of the better ones are confined to expensive lathes of large capacity, developed by the lathe manufacturers themselves; those for smaller lathes are more rudimentary. Page185

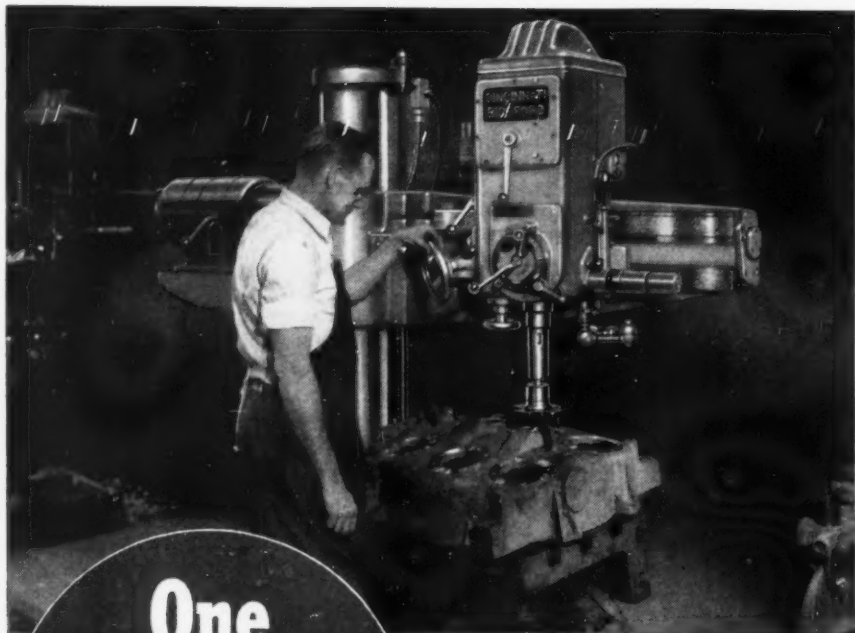
Management-Labor Standard of Government Contractors, by Robley D. Stevens.

What's the minimum wage rate? What records must be kept? What group of employees are exempted? What method of calculating overtime pay is essential? The writer, while with the U. S. Department of Labor, discovered a number of metalworking firms were not adequately informed on the basic requirements of the Walsh-Healey Act. As a result, they unwittingly operated in noncompliance and were heavily penalized. Page197

BLUE BOOK'S "Know-How" REFERENCE SHEETS. Four handy tables are included in this month's reference sheets. They are: "High Speed Steel Drilling Speeds and Feeds for Various Materials"; "Carbide Drilling Speeds in Surface Feet Per Minute"; "Suggested Surface Speeds for Various Work Materials (in feet per minute); "Suggested Table Feeds (in inches per tooth) for Various Work Materials when Machined with Multiple Point Tools." Page207

How to Select the Proper Steel for Long, Productive Die Life, by Stewart G. Fletcher. Because of the large number of die steels on the market, the general lack of classification and the fact that each tool steel manufacturer and steel jobber has his own steels called by name, die steels have become a complex problem. Die steels are of many types, for the performance of many different functions. Diversity of required properties has naturally led to the development and marketing of many types of die steels, with hundreds of different die steels within each type. Many of these are duplicates. Page214

Special Report on Grinding Machines, by Sidney M. Napp. This report, No. 30, is part 4 in the grinding series. This authoritative article deals with flat surface disc grinders and covers the (1) field of application (2) basic types of applications (3) types of tooling. Mr. Napp is chief engineer of Besly-Welles Corp., Beloit, Wis. Page249



**One
set-up saves
30%**

Photos courtesy of the Kelman Electric & Mfg. Company, Los Angeles, California.

Boring, facing, and high speed drilling with one set up cut the floor to floor time about one-third on this job.

The Kelman Electric & Mfg. Company say their Cincinnati Super Service Radial Drill "handles easily, is very accurate and versatile."

They are facing 6" diameters, drilling for $\frac{1}{2}$ " bottom tap, and tapping with a $\frac{1}{2}$ " bottom tap on this job.

The part being processed is a Bronze Top Casting.

Cincinnati Super Service Radial Drills are profit makers in this shop, and they could be in yours.

Write for Bulletin R-21C

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BICKFORD**



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THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio, U.S.A.

AS THE *Editor* SEES IT

The Guaranteed Annual Wage

The UAW-CIO, at its recent convention, voted to make the guaranteed annual wage its new collective bargaining objective. Possibly, this was done because increased wage objectives would meet a brick wall; the guaranteed annual wage would make a noble crusade. Unions, to hold their memberships, must lead flaming crusades, they must keep the workers in constant excitement, they must stir the membership to continuous turmoil. The annual wage promises to be a dilly!

Roughly, what the CIO proposes is that the employer make up the difference between the worker's wage and the amount of unemployment insurance given him by the state. To do this business must have a hoard (of good size) constantly on hand to meet the threat of unemployment. When the hoard is exhausted business will lock its doors and throw away the keys. It's as simple as that.

The position of the CIO is that the worker is not responsible for his unemployment. He is blameless for economic disturbances. Business, on the other hand, doesn't care about economic disturbances or unemployment. The CIO says that business has the power to solve the unemployment problem, but does not use the power. If, however,

business had to pay the cost of unemployment it would make certain that no worker would ever be out of work. Hence, there would never be an unemployed Great Lakes seaman in those industries guided by the enlightened guaranteed annual wage.

Isn't that a pretty thought? Isn't it precious?

This is typical union thinking: Business is a mangy cur, responsible for all our seasonal and cyclical disturbances. Make them pay if a worker is unemployed. Let business set the economic world in order and everything will be sweetness and light.

The horrible part of all this rot is that union members and the public, as well as the last Administration, believe this. The public firmly believes that depressions are caused by avaricious business. The campaign slogan of the last election, You Never Had It So Good, proves that credit for prosperity is given 100% to the late Administration without whose help we would groan in the chasm of disaster. The CIO is jumping into the breach caused by the defeat of the last Administration. Someone must champion labor and restrain business.

Business is dead! Long live the guaranteed annual wage! Long live prosperity!

William F. Schleicher

LOOK...

no hands!

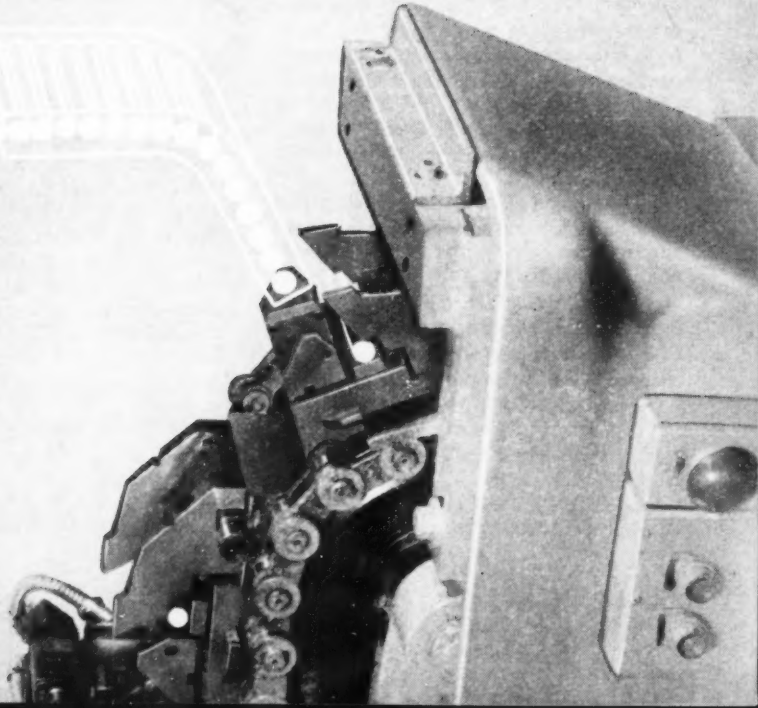
**AUTOMATIC
HANDLING**

plus

**CONTINUOUS
BROACHING**

Combined to Increase

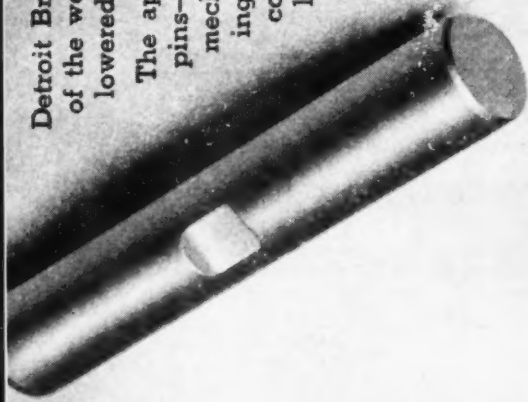
Production 12.5%



Detroit Broach adds a new dimension in broaching economy . . . automatic handling of the work. By eliminating manual loading, production ceilings are raised, costs are lowered and continuous efficiency is assured *independent of the human element.*

The application above—facing the ends and producing a flat on automotive king pins—illustrates typical benefits. Here, Detroit Broach applied a hopper and feed mechanism to a continuous broaching machine and thus eliminated manual loading of the parts. Precision tolerances are consistently held, production runs continuously and costs are at rock bottom. In this application the hopper is loaded manually, however, in many instances the hopper can be fed by conveyor from the previous operation.

On present or proposed broaching operations it will pay you to discuss automation with Detroit Broach engineers. Chances are these broaching specialists will be able to come up with recommendations that will result in considerable savings for you. If you will just drop us a line, the nearest Detroit Broach representative will give you all the details without obligation.



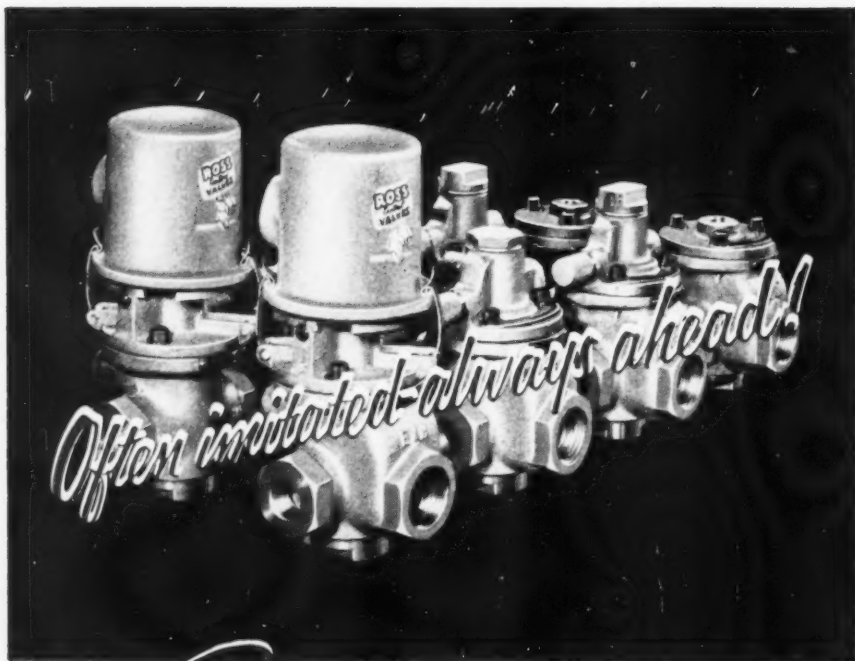
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- ✧ Low current consumption for solenoid models—inrush of 1.2 amps @ 110/60.
- ✧ Positive seal—poppet construction; Hycar seats.
- ✧ Easy maintenance—only a few moving parts; can be disassembled without breaking line connections — solenoids readily accessible.
- ✧ Many modifications—vacuum, air, and liquid service; various pressures; available for AC or DC solenoids or air actuation with or without sequence timing; interchangeable heads.

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LAST MINUTE WASHINGTON NEWS



by Arnold Kruckman

Washington Correspondent



We are told the New York financial pundits emphasize that the principle manufacturing industries are producing all they can and shipping all they make. Many are reported to be operating against large unfilled orders; others are very optimistic and are stocking their distributors to fill spring prospects. As the New York and Washington sages see it, the country could hardly be busier than it is now. In many areas production is limited by labor supply or plant capacity, and in some few instances by scarcity of industrial materials. We are told pressure on the steel mills is unabated. The same sources are responsible for the report that there have been significant increases in new orders for machine tools. And they say the people continue to be willing to spend and to borrow for spending. All this is confirmed by the latest survey made by the Board of Governors of the Federal Reserve System. The report indicates that plant expansion and improvements are still going forward at a record rate. It is estimated expenditures will go well over 2% of 1952. On the other hand, it is reported debt has risen and credit has tightened. Labor is expected to press for increases after the steel workers make the initial demand.

On the optimistic side, Secretary Weeks is responsible for the statement that chemical and rubber firms expect increases; the petroleum people look for sales to be 4% better; power companies plan 11% increase in revenues; air lines, 12% increase; gas companies have prepared for a 15% increase; automobile manufacturers have prepared to sell 22% more cars; the steel people point out they are now producing 118 million tons of steel and are at the limit of current distribution. They could sell more.

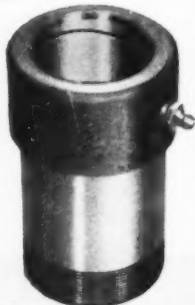
On the other hand, many business men openly ask whether the output in prospect this spring will in fact be absorbed, and high operating rates sustained by sales, or whether the markets are being over-crowded. The answer to that question is expected to spell the probable level of productive activity in the last half of the year. They tell us there are signs that some consumers are holding back waiting for prices to drop. This has caused some business men to cut inventories and spending plans. It is no secret that U.S. Steel definitely plans to materially cut its public relations program in the next season.

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GUIDE
PIN
BUSHINGS**
BRONZE PLATED ON
HARDENED STEEL

...now in two styles

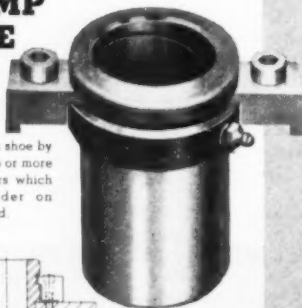
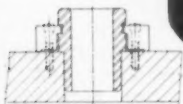
**NUT
TYPE**

Is secured in shoe by tightening nut on end of bushing. Nut is located in counter-bore in shoe for flush assembly.



**CLAMP
TYPE**

Is secured in shoe by means of two or more clamp fingers which grip shoulder on bushing head.



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PATENT PENDING

The bushing that gives you the long-wearing features of hardened steel yet provides the seize-free, score-free performance of soft bronze is now available in the two styles at the left.

The Lamina Guide Bushing is hardened steel with free-running bronze electroplated on the inside diameter. A $\frac{1}{16}$ " oil groove further lubricates the inside of the bushing in a double figure-eight pattern. Ordinary grease is fed to the groove through a standard Alemite fitting.

In addition to the improved wearing qualities of the Guide Bushings, Lamina Guide Pins give longer service, too. Made of water-hardening tool steel, these pins eliminate the brinelling and "mushrooming" characteristic of case-hardened pins when driven into the die shoe.

Both styles of these bushings are stocked in a variety of lengths and diameter for straight, shoulder and removable pins. Lamina Dies and Tools, Inc., 14925 W. Eleven Mile Road, Berkley, Michigan.

This new brochure fully illustrates Lamina facilities, dies, tools and die making equipment. Send for your copy, there is no obligation.



Lamina
DIES AND TOOLS

Uncertainties and pessimism naturally were aggravated by Secretary Charles E. Wilson's statement that he intended to reorganize defense mobilization by drastically reducing the number of companies to make war goods. The plan included the closing of a number of Government arsenals and other facilities operated by the Government. But the smaller plants which have had a part of the defense business would be hit hardest. The Wilson plan was intended to concentrate operations in the largest plants. The Office of Defense Mobilization, with the approval of the President, has rejected General Motor's Wilson scheme for the plan that was worked out by the former head of ODM and by General Electric's Wilson to spread the business as widely and broadly as possible. Explaining General Motor's Wilson plan, Assistant Secretary of Defense, W. J. McNeil said, "Some of the program got out of balance. It is intended to make the day-by-day adjustments to keep the over-all program at maximum efficiency. As certain levels of mobilization reserves are met, and as production reaches a plateau, there will be a decrease in the number of plants engaged in active production of military items. This will eliminate some of the less efficient, high-cost producers whose productive capacity was temporarily required during the initial build-up." This led Senator Leverett Saltonstall, Chairman, Senate Armed Services Committee, in a letter to Secretary of Defense Wilson, to point out, "I have always felt that a broad industrial mobilization base was of extreme importance for the present and future security of our country, and that the money spent for such a base, if properly thought out and properly expended, was money that the taxpayer could well afford for our citizen's security. I look with great apprehension on any radical change in this concept."

It is well known the President feels big defense spending will be with us much longer. As this column has frequently emphasized over the past months, Eisenhower, and the best talents in the Pentagon, have felt certain the time would come when they would have to greatly increase military and other expenditures in Indochina and other parts of Southeast Asia. The present situation in Indochina is expected to cause a political conflagration in Siam and Burma, and our involvement is regarded gravely inevitable.

* * *

Walter Williams, Under Secretary of Commerce, recently tried to answer the question what would happen after defense spending. He said, "Consideration of this problem must be made in the same vein that a business man would consider any other problem which confronts him day-by-day—not in a furtive, half-scared manner, but in a fully confident, straight forward manner. Those who see a slackening-off of Government expenditures portending a sharp business decline argue: (1) that the plant and equipment investment account, high in recent years, cannot go forward at the same rate (These individuals overlook the terrific influence upon our economy in the need for continuing expansion of plant and equipment by the ever increasing wants, never satisfied, of 159 million American citizens.); (2) they fear the impact of the decline of Government's expenditures on the residential construction field. They don't study population growth, new marriages, new births, new households, and the need of those families for more space and better accommodations

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Note the heavy web design of these drills, it also contributes to the unusual strength and durability that enables Hercules High Speed Drills to withstand greater torsion.

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which constantly increases pressure upon the house construction industry for more and more homes; (3) others see a decline in consumers' demand for durable goods. Consumption of electrical energy is doubling every few years. Household 'musts' include a complete array of electrical gadgets, the like of which no one ever dreamed a few years ago; (4) there are those who feel the aggressive spirit of business men and promoters of new business ventures will be dulled by a super spirit of caution as there develops a leveling off, or a slight downturn in the business curve. In the free enterprise system it is to be expected that we will have ups and downs; (5) people refer to the factor of psychology, which may provoke fear and caution and the hope 'I can buy cheaper in six months'—this we must meet with education; (6) many think a downturn is historically inevitable. No one living today can possibly tell whether we have learned enough about our economy to keep it within bounds and thus avoid violent downturn. We should be able to apply our economic education to prevent a downturn; (7) some fear that a decline might affect two or more of our major industries simultaneously. Against that we have what I call built-in props, such as unemployment insurance, social security benefits, etc. And reduction of the tax burden would help individuals and businesses. The productivity curve steadily increases. This means increase of purchasing power. I think population growth alone is enough assurance to quiet the fears of the most frightened skeptic. The productivity rate increases 3% a year, or in five years 15% per capita. With a gross national output of \$365 billions per year, 15% of this figure is nearly \$55 billion per year. This would take care of the present expense program without affecting our normal domestic economy. I'm impressed by the fact that our obsession with periodic cyclical downturns inspires a fear that is a disease. We must conquer such fright. Here are a few suggestions: Managers of business should get a better understanding of our economic system. They should adopt better technological methods; develop better research programs; achieve greater efficiency and economy; develop lower prices for better goods; make what they sell more attractive to a consuming public whose wants can never be wholly satisfied. Management should concern itself with health conditions within the plant, and elsewhere; with the need for better communities; with plans and actions for better working relationships with its employees; with programs for improved relationships with customers, and better relations with the community as a whole. And it should concern itself with a development of better relationships within its own management force. As has already been indicated, management most certainly should, in this period, devote itself, to a degree that it has never devoted itself before, towards the development of a sales promotion program of quality and extent which will help not only the given business, but the economy as a whole.

"Let's recognize that the curtailment of these terrific expenditures for instruments of destruction does indeed mean lessened budgets. Lessened budgets mean reduced taxes. Reduced taxes mean more money in your business and more money in your private pocket to spend as you want to spend those moneys, not as Government would want to spend it for you. Is this exactly to be classified as a calamity?"

How's BUSINESS ?

Investment During 1953

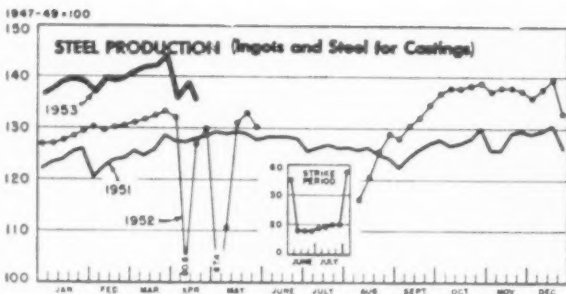
Capital spending is scheduled at seasonally adjusted annual rates of \$27.8 billion in the first half of this year. Comparison of this rate with programs for the full year implies a lowering in the rates of fixed investment of almost 6% between the first and second half of 1953. The imputed rate for the final six months, however, is probably understated relative to earlier months due to the tendency for under reporting to increase with the period of forward planning.

Current programs do not show the clean-cut divergence in spending patterns between defense and non-defense industries which characterized fixed investment in 1952. Most of the capital expansion last year occurred in defense-supporting industries—with most nondefense groups cutting back from, or maintaining, 1951 fixed investment rates.

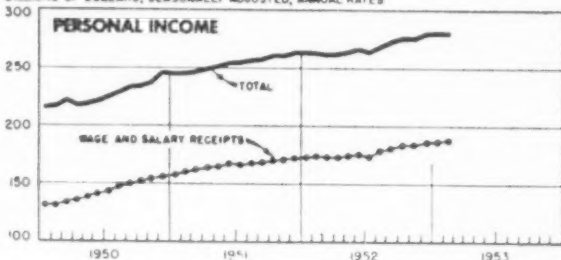
Actual capital expenditures in the fourth quarter of 1952 amounted to \$27 billion at seasonally adjusted annual rates, about 6% above the strike-affected third quarter, but only slightly above rates in the first half of last year and the latter half of 1951.

General Business Indicators

source: Dept. of Commerce



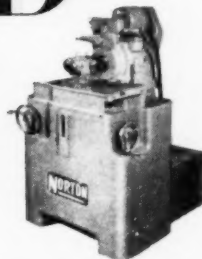
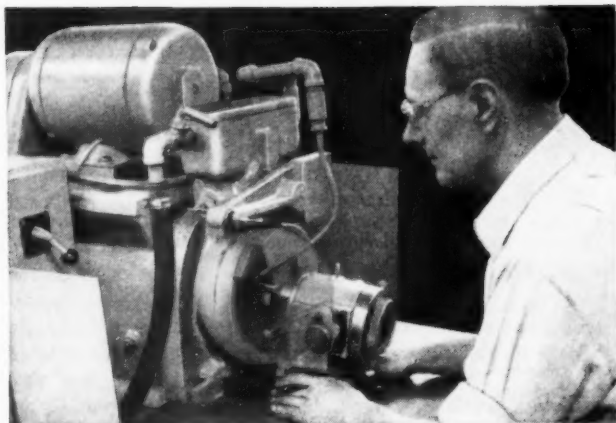
BILLIONS OF DOLLARS, SEASONALLY ADJUSTED, ANNUAL RATES



(BILLIONS OF DOLLARS, SEASONALLY ADJUSTED)



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When he's sharpening your carbide-tipped tools on the Norton No. 2 BURA-WAY he is adding longer life value to the tools, helping you to make more profit and turn out better products for your customers. Every time the wheel touches the tool, it adds the product-improving, cost-cutting "Touch of Gold."

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mented by Norton trained engineers. Only Norton offers you such long experience in both grinding machines and wheels to help you produce more at lower cost. Write NORTON COMPANY, Machine Division, Worcester 6, Mass.

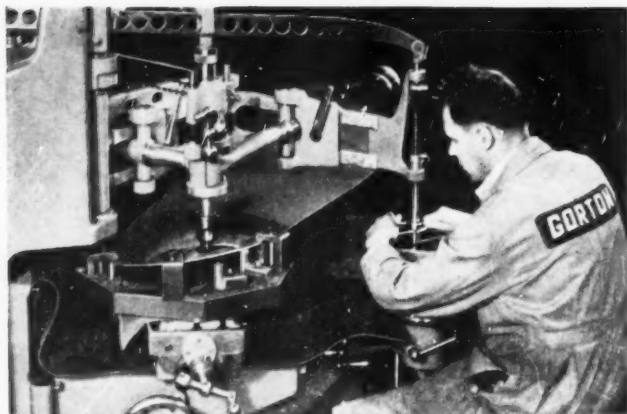
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Tracer-Controlled Pantograph cuts and rounds thermal slot in 8-foot steel propeller blade in 40 minutes; previous time was 5 hours, 10 minutes — just one of hundreds of examples of time and cost saving with tracer-controlled Pantograph machines.

Pantography IS NEW —

By George Gorton III
Executive Vice President
George Gorton Machine Co.

— in the sense that industry at large and Metal Working people in particular are just beginning to appreciate the many advantages Pantography offers to those faced with the Design-Production problems of today and tomorrow.

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Outlays in the first two quarters of this year are scheduled at annual rates of \$27.5 billion and \$28 billion. The expansion in scheduled outlays in the first half of this year is attributable primarily to the utilities and to manufacturing companies. Anticipated capital expenditures by the railroads are also up somewhat, while plans of other major industries show little change from 1952 rates.

In the 1951-52 period the major stress in industrial expansion had generally been to provide needed additional capacity for defense production. This year, however, the character of plant and equipment expenditures appears to be changing. Some defense industries have begun to show declines. Some non-defense industries are

showing increases after curtailing expenditures during the defense buildup, while other industries with both defense and nondefense characteristics are continuing to expand.

Reflecting this situation, 1953 finds durable-goods industries expecting a 5% decline from last year's capital expenditures offset by an increase of the same magnitude planned by nondurable-goods industries. The durable goods group also primarily accounts for the slackening in manufacturers' projected investment rates in the latter half of this year.

The iron and steel and nonferrous metals industries account for most of the expected reduction in outlays by durable goods producers. Iron and steel companies, after a record expenditure in 1952, are dropping their 1953 programs by 12%, while nonferrous metals firms are reducing outlays by 11%. Last year the nonferrous metals industry almost doubled its 1951 expenditures.

Sales Expectations in 1953

The April issue of Current Business, prepared by the U.S. Department of Commerce, Office of Business Economics, from which the survey of 1953 capital expenditures was abstracted, also has something to say about sales expectations in 1953.

Businessmen are currently expecting to achieve the largest sales volume on record in 1953. Every major nonfarm industry anticipates higher sales in 1953 than last year.

Among major industry groups, the largest relative increase in sales from 1952 to 1953 is anticipated by public utility companies—11%. Manufacturers project sales volume in 1953 more than 7% higher than last year. Nonrail transport companies look forward to a more than 5% gain from 1952, while mining concerns foresee a sales rise of 4%.

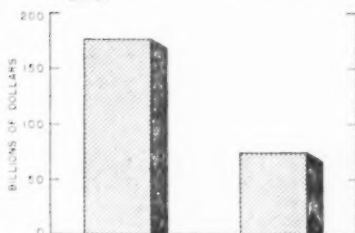
Within manufacturing, the durable-goods group is expecting an 11% rise in sales from 1952, as compared with a 4% increase by nondurable-goods producers. The expectations of the latter group, however, imply an increase for the year as a whole of 5% from annual rates at the beginning of the year, while no further gain is indicated by the durable-goods sector.

Relative to current sales volume, the greatest expansion in sales during the

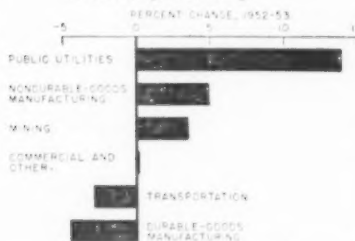
Plant and Equipment Outlays Programed at \$27 billion in 1953....

will bring total nonfarm fixed investment since 1945 to \$176 billion

Manufacturers account for over two-fifths of this total

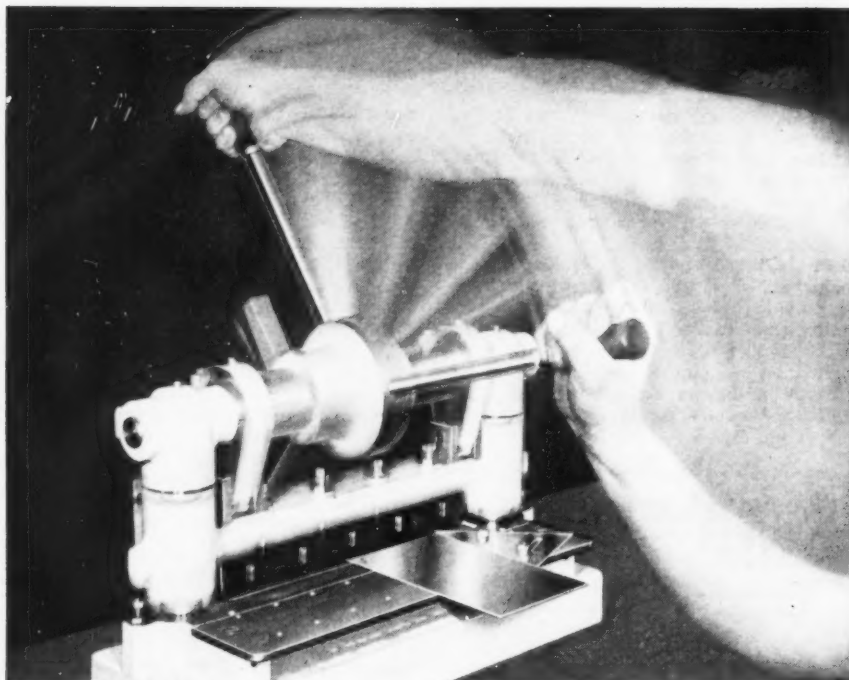


In 1953, planned investment increases are centered in utilities, nondurable-goods manufacturing, and mining



U. S. DEPARTMENT OF COMMERCE, OFFICE OF BUSINESS ECONOMICS

DEPT. OF COM. - 52-111-1



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Index of new orders and shipments of machine tools

source: National Machine Tool Builders Association

Month	Domestic	Foreign	Shipments	Ratio Unfilled Orders to Demonstrated Production Rate
April	233.5	15.6	307.9	14.8-1
May	284.6	31.4	323.0	13.6-1
June	342.9	20.3	330.8	12.6-1
July	374.6	14.9	257.2	12.5-1
August	309.1	22.7	314.8	12.4-1
September	302.4	23.1	368.6	11.8-1
October	243.3	22.5	338.2	11.1-1
November	205.4	14.3	342.5	10.3-1
December	225.2	19.6	355.0	9.8-1
January	255.9	26.3	361.6	9.4-1
February	282.1	22.9	354.5	9.0-1
March	p. 323.5	p. 17.6	p. 376.0	p. 8.6-1

remainder of 1953 is anticipated by the nonautomotive transport group and by electrical machinery producers. It is of interest to note that recent order trends have been quite strong in these industries.

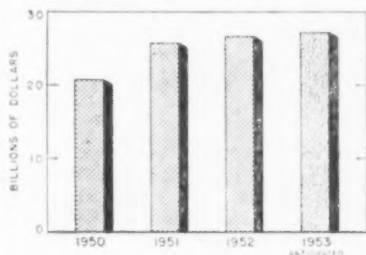
While all size groups of manufacturers are expecting a higher sales volume this year, in about two-thirds of the major industry groups the larger companies anticipate the greater relative gain. In aggregate, manufacturers with assets of over \$100 million are thinking in terms of a 12% increase in sales from 1952 to 1953,

as compared to an expected increase of somewhat over 7% by all manufacturing companies combined.

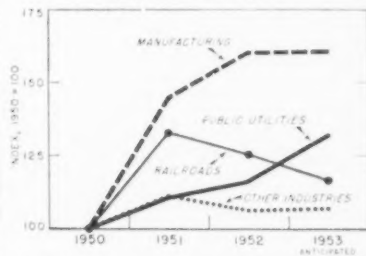


Business Plant and Equipment Outlays

Business has programed continued high investment in 1953



Utilities continue expansion, manufacturing remains high, rails curtail programs



U. S. DEPARTMENT OF COMMERCE, OFFICE OF BUSINESS ECONOMICS 27-15



Letters TO THE EDITOR

Like the Drilling Reports

During the past year I have been receiving individual copies of MACHINE and TOOL BLUE BOOK machine reports and I am very glad that you have continued my name on your mailing list.

We in the Oldsmobile Methods Engineering and Plant Layout Department find them very useful so I hope that you will be able to continue to provide us with the machine reports. . . . we feel that you have done a very fine job in editing this material.

*R. P. Russell, Supv. Methods
Eng. & Plant Layout Dept.
Oldsmobile Div., General Motors
Corp.*

“ . . . we have made good use of your Report on Drilling Machines. They have proved helpful. May I take this opportunity to thank BLUE BOOK for its prompt compliance with our request.

We have and are still using copies of the report in our drilling department. The terminology and presentation was such, that the newer men became familiar faster with our own usage of drilling terms, and operations. The examples of drill grinding and resharpening helped to guide the inexperienced, and aided the more skilled men to become more conscious of selecting tools for the specific job on hand. Your reference to speeds and feeds for various materials are being applied more readily by the operator under his own initiative, rather than by his supervisor. Overall, our drilling department has now a ready reference at

the machine, and a re-awakening to new ideas, that are proving worthwhile.

*Arthur Illies, Night Supt.
American Machine & Foundry
Company*

I did receive recently your report on drilling machines and I want to go on record as saying that we appreciate these detailed equipment reports very much. In our particular shop we do a lot of drilling and tapping and we thought the technical information, in addition to the facts on equipment, very helpful.

We have a separate section setup in our Engineering Dept. for the purpose of analyzing and evaluating various types of equipment. These reports, which you have been sending to me, eventually wind up in their files where they are used for reference, not only in the purchase of equipment but by our Time Study and Methods Engineering people as well. I hope you will continue to favor us with a copy of any future report.

*R. S. Fries, Supt. of Mfg.
Minneapolis-Honeywell Regulator
Company*

Received your Boring Machines as well as your Drilling Machine reports and am very much pleased with them.

I had intended to use these reports for a comparison of machine specifications as well as an index of machine builders.

In this connection the reports leave nothing to be desired. The only suggestion I have is that a chapter on accessories for these machines would have completed the picture. But I am assuming

that a separate report on this topic is forthcoming.

Thank you for your considerations and I hope to be on your mailing list for future reports.

Anton I. Matty, Tool Eng.
J. A. Maurer, Inc.

A number of readers have raised the question of accessories: they will be treated at the end of the machine tool reports and will be included in the combined Vol. 1 and Vol. 2 of American Built Machine Tools.

Who, if not you?—When, if not now? Cards Still in Demand

I would appreciate one or several of your signs, Who, if not you?—When, if not now?

W. C. Wright, Shop Supt.
Saco-Lowell Shops

We would like very much to have one or two of the cards you had printed, Who, if not you?—When, if not now?

H. J. Leitcher
Leitcher Mfg. Co.

We would like to receive one of the Who, if not you? cards. If it would not be asking too much we would like to have three of them.

Charles M. Jamieson, Pres.
Jamieson Aircraft Company

If you can spare four Who, if not you? cards, I would be glad to have them.

William F. Barrett, Gen. Mgr.
Edroy Products Company

Reduce Carbide Tool Breakage on Milling Machines

Your April, 1952, issue contained an article by Mr. James Joseph on the use of overload gauges to reduce carbide tool breakage and gave the name of the Pyramid Instrument Company as the manufacturer of the Amprobe ammeter for use with clamp-on milling machine setups.

We would like to learn more about this instrument but have not been able to locate the manufacturer. Can you furnish us with his address? Or perhaps you could forward this inquiry to the

Pyramid Instrument Company with the request that they send us their catalog.

J. Vandlik, Gen. Foreman
Acme Steel Company

Some time during the middle of the past year I had the opportunity of reading an article of one of the issues of MACHINE and TOOL BLUE BOOK concerning the application of ammeters or horsepower meters on machine tools. This article dealt particularly with the use of these devices on machines equipped with tungsten carbide cutting tools.

I would appreciate very much receiving a copy containing this article.

Lee A. Drake, Tooling
Coordinator
Ensco Manufacturing Co.

The article referred to is James Joseph's You Can Cut Carbide Tool Breakage by 50% . . . Install an Overload Gauge. The Amprobe ammeter referred to in the article is manufactured by the Pyramid Instrument Co., 49 Howard St., New York, New York.

New Grinding Methods Conserve Diamonds

Please send me a reprint of the article, New Grinding and Machining Processes Promise Conservation of Diamonds, by Bryan M. Baker, which appeared in the December, 1952, issue of the MACHINE and TOOL BLUE BOOK.

P. G. Patch, Project Engineer
McCulloch Motors

. . . would appreciate receiving the reprint, Savings Claimed for New Grinding Procedures, which I believe I'll find extremely helpful.

H. Golden, Foreman
Wentbury, New York

We would greatly appreciate it if you would send us for our library a reprint of each of the following articles: New Grinding and Machining Processes Promise Conservation of Diamonds; and Flame Hardening of 30-foot Long Lathe Bed Ways.

Claire D. Ferguson, Librarian
The Warner & Swasey Co.

FASTEST MACHINING STEELS!

You get them all . . . at Ryerson

FAST CUTTING STEELS IN STOCK

LEDLOY—You can't buy a faster machining steel. See why at right.

RYCASE—Low carbon, high manganese, open hearth steel with excellent case hardening characteristics. Yet machinability rating is within 10% of Bessemer screw stock.

C1117—Open hearth high manganese steel widely used for combination of good machinability and good carburizing properties.

B1113—If you want Bessemer screw stock, this is one of the fastest available. Machines at 225 SFM. High sulphur content.

C1213—The open hearth equivalent of B1113. Machinability slightly better. Cold working properties much better.

B1112—The standard Bessemer screw stock on which machinability ratings of other steels are based.

C1141—Often used instead of C1042 because of high strength, better machinability and greater resistance to wear. Responds well to heat treatment, flame or induction hardening.

RYTENSE AA—Improved medium carbon, high manganese steel. Machines at 125 SFM, leaving smooth finish. Good as-drawn mechanical properties and may be heat treated or hardened.

RYCUT ALLOY STEEL—A medium carbon alloy that machines 25 to 50% faster than standard steels of same type.

FREE-MACHINING STAINLESS—Type 416, a 12% chrome analysis with superior free-machining properties. Also Type 303 for better corrosion resistance with excellent machinability.

E-Z CUT PLATES—Special high manganese steel with controlled sulphur addition. Cuts cleanly at speeds up to 35% faster than ordinary steel.

Interested in cutting the cost of machined parts? Your nearby Ryerson plant offers quick delivery of the fastest cutting steels on the market—steels that will boost man-hour production; save you money.

Carbon steels, alloys, stainless—whichever you need, Ryerson is your best source. Take Ledloy for example. This open hearth steel machines at surface speeds of 300 feet per minute or better, making it the fastest cutting steel available today. And Ryerson was the first to offer Ledloy for shipment from stock.

Similar in chemistry to C1213, Ledloy contains a very small amount of lead which acts as a lubricant between steel and cutting tool. As a result Ledloy users get greater production, longer tool life and a better finish on machined parts. In addition, Ledloy can be case hardened, bent or swaged.

The wide selection of other free-machining steels in Ryerson stock—ready for quick shipment, is indicated by the brief list at left. And remember, our steel specialists are always glad to work with you on any machining problem.

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The Carbide Milling of Cast Steel Components

by **Herman Reichardt**
Consulting Engineer

THE MILLING of cast steel components presents an interesting analysis and one well worth considering since it emphasizes the importance, in carbide milling, of properly identifying the workpiece material. The large cylinder of cast steel, shown in figure 1, is being carbide milled on a horizontal bar. The job consists of milling the ends of a cast cylinder, with wall thicknesses of approximately three inches in the rough.

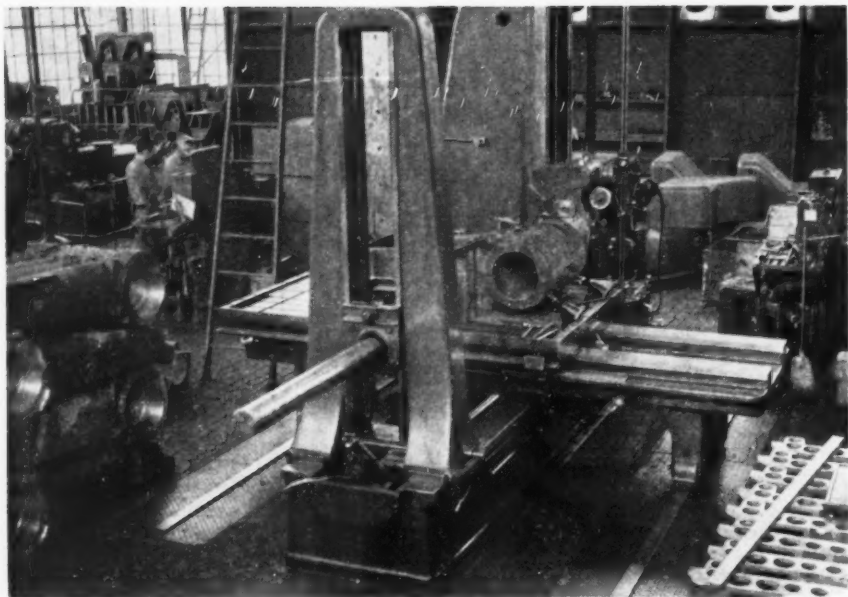
The use of a 5" horizontal bar of standard design, with none of the specialties in its construction usually associated with carbide milling, makes this an instructive project from the standpoint of the use and application

of a piece of standard equipment designed without thought of the exigencies of carbide metal removal, and from the viewpoint of the use of a horizontal bar for this operation.

The use of this 5" bar is, of course, justified not because of its ability primarily to do an excellent milling operation but because the boring of the cylinder must be effected on a piece of equipment such as this with the "facing" operation turning out to be a face milling job. This latter will be considered in detail.

The table for the selection of surface foot rates indicates that cast steel, regardless of its blood relationship to steel, must be milled in exactly the

Milling the ends of cast steel cylinder walls presents some interesting problems when carbides are used. In this operation a 5" horizontal bar was used for the milling job. A total cutting time of 10 minutes was achieved, contrasting with a 50 minutes cutting time using hss. Basic methods of estimating power consumption, ipm and cutter requirements are thoroughly described. This information can be used on all milling operations where carbides are used.



1. Carbide milling cast steel cylinder ends on a five inch horizontal bar.

same manner as cast iron, insofar as the surface foot rate is concerned. The table calls for a surface rate not greater than 300. If the sand inclusions and the surface quality of the casting is on the bad side, the rate should be decreased; in some instances, with large sand inclusions and much "floating" sand on the surface of the casting generally, the rate has been reduced successfully (from the standpoint of cutter life) to as low as 225 feet per minute. The exact selection is naturally, as in all these planning details, largely a matter of experience. The book will provide the limits but experience must make the final choice of a specific rate.

For the job in hand, a large power cylinder for rock crushing machinery, the choice is 300 feet per minute. The quality of the casting is excellent, with little sand inclusions and a remarkably clean surface.

The selection of a cutter must be determined, first, as to diameter. The wall thickness is approximately 3" but since this cylinder face is to be "profiled" the cutter size will be greater than ordinarily required. Moreover, the cutter should be so related to the workpiece, as regards positioning, that the arc of contact will be greater than the pitch of the teeth in the cutter. Since the pitch in the cutter that will be used here is 3.14 (the number of teeth equals the number of inches in the diameter), the lengthening of the arc of contact beyond the 3.14" of the tooth pitch means that more than one tooth will be in contact with the workpiece at any instant. This is extremely important in carbide milling since, with coarse pitch cutters as used for this technique, the tendency in narrow-faced cuts is to get the disadvantages of terrific impact blows with the entrance and exit of

each tooth. Even flywheels will not eliminate all the difficulty and prevent all the damage; it is necessary to plan the carbide operation, if at all possible, so that more than one tooth is in work contact at all times. And this can be done with a little forethought and common sense. That is another reason for offsetting the center line of the cutter from the center line of the workpiece. In narrow surface milling so offsetting the cutter, or setting it "on the bias" as the shop refers to it, makes it possible to keep two teeth biting into the work at all times by properly offsetting the cutter in relation to the job. This gives a much better tooth entrance angle (closer to 90 degrees) and permits taking a bigger bite at the beginning of the cut. This latter refers to the reduction, if not elimination, of much abrasion and friction due to the rubbing action on a blade when cutting a thin, feather-edged chip. The specification of a right-hand cutter for this operation is important: first, the cutting forces are thus directed against the column face because the cutting forces tend to push the knee against the column and not away from it. The latter action is already well started by the forces of gravity—not a small item with a knee and mechanism that weighs thousands of pounds. Second, this choice of cutter, in this setup, assures the direction of the cutting forces against the solid jaw of the vise and not against the movable. All of these details, while always characteristic of good milling practice, are all the more important today when cutting forces and speeds have been stepped up many times.

The cutter, then, is specified as 8" in diameter, 8 teeth, and as having the proper carbide grade of blades. This latter again is best left to the manu-

facturer and his recommendations: but it is in this application that a grade of carbide between the straight tungsten carbide and tungsten titanium carbide gives the best account of itself. It is sufficiently strong to stand up against material with a psi of about 50,000 in tension and at the same time, if operated at the correct surface foot rates, will stand up against the wear to which it will be subjected by this sandy material.

The metal removal rate determination is an interesting phase of this planning job.

Insofar as the workpiece is concerned it is sufficiently rugged to "take" any cutting forces to which it may be subjected. Moreover, the specifications for tolerances are such that there need be little hesitation to hog this metal off: both the finish and accuracy tolerances provide much latitude.

The metal removal rate, since no limitations are imposed by either the cutting material or the workpiece, will definitely be determined by the horse power available in the machine and by an additional factor, about to be discussed.

This 5" bar normally has a 15 hp motor available for the spindle. This was replaced by a 20 hp motor, not only for this job but for other carbide milling operations. The K^* factor of this ex-

Ed. Note: In the past it has been customary to express power in terms of experimentally determined values representing the horsepower at the cutter per cubic inch of rate of stock removal (factor K). It has been found that this is no longer necessary, however, because any series of K values, obtained by varying a given variable of the cut, can be represented by a constant value a which expresses the horsepower at the cutter when the rate of stock removal is one cubic inch per minute. See: A Treatise on Milling and Milling Machines, The Cincinnati Milling Machine Co., Cincinnati, Ohio. The letter K is not used in this text; instead, the letter a represents the same values as K .

cellent equipment is as low as .5 for this cast steel material when the cutter is close to the table. When it is necessary to raise the spindle to get at the upper portions of a job, as is necessary in this cylinder operation, then the K factor obviously increases. That is, the tendency to vibrate is increased, and the resulting increases in power are evident in an increased K factor. Allowances must be made for a job in which the relationship of the cutter (and spindle) and the solid supporting members of the machine tool, such as the table, are not ideal. As the ideal relationship is deserted, solely because of limitations imposed by the nature, construction and design of the job, the amount of power required to remove the same amount of metal will be greater.

The cylinder for the rock crusher measures 40" outside diameter. When the cutter is working on the upper arc, 40" away from the solid supporting table, the couple formed by the cutting forces and this 40" tends to distort the column away from the table and the spindle, and its housing away from both.

The K factor selected for this operation is .75. That is, it requires, according to this estimate (which was later confirmed by experimentation), three-quarters of a horse power to move one cubic inch of metal in this position each minute.

Thus the 20 horse power can be safely expected to make chips at the rate of approximately 27 cubic inches per minute. And this is a safe K factor with which to set up a job of this kind.

The sectional area of the cut is a factor to be given careful consideration. Actually, on the job, it is well to match an 8" cutter against the cylinder end, 3" thick, to get a fair approximation to the length of the cut made by this type of cutter and cutter application. It will be clear that the length (projected

length) of the path cut by the cutter will at times be close to 6". The amount of metal to be removed from this heavy casting was as much as .300". Ordinarily castings can be held to .125" limits but because of its size and the fact these ends were used for heads and risers, the stock to be removed frequently went as high as .300" and occasionally over. But the latter was so infrequent and the area covered so small that it was considered justifiable to disregard it. The momentary increase in power would not hamper the machine operation, and certainly not cause it to stall.

The sectional area of the cut then is 6" by .300", or 1.8 square inches. This results in a feed rate of 15 ipm. But here it is important to give due consideration to the effect of profiling, so called, on the feed rate. When the vertical feed on the head or bar is engaged at the same time that the longitudinal table feed is used it is referred to as "profiling." This is probably an arbitrary designation but it is understood



in the shop and there may be some justification for it since it is possible with such a combination of feeds to direct a cutter around the profile of a job or job section. At any rate, when the two feeds are being used simultaneously to keep the cutter swinging around the 40" circle, then the feed rate is no longer 15 ipm but the square root of the sum of the squares of the two feeds (both feeds being the same, that is, 15"). This results in an ipm of approximately 22". Unless this were taken into account the machine could easily be overloaded.

At the combined feed rate, that is when profiling, the metal removal rate is increased from 27 cubic inches per minute to 39.6 cu. in./min. This is an increase of over 40% and hence represents a factor that must be considered. The feed rate, in any direction or of any member, will then be reduced by 40%, hence instead of being set at 15, the rate will now be reduced to 9 ipm, theoretically at least.

If a good operator is at the controls of a machine of this kind the combination of feeds will not be used except when necessary. He will start the 8" cutter into the cylinder wall along its horizontal axis, cutting a swath through the face at this point. When the cutter has entered so that 6" of its diameter is imbedded in the face, then the vertical feed (or the feed on the bar) will be engaged long enough to get the cutter feeding to the vertical. At a point not far away the vertical feed will be disengaged leaving only the horizontal, or table feed, in effect; thus the cutter is swung artistically around the 40" circle without the least apparent effort on the part of the operator or on the part of the machine. In the hands of a skilled operator the simultaneous engagement of the two feeds will be held to a minimum. Hence, the overloading of the machine would be held to a minimum if the feed rate for one

movement (15") were actually used. If the 15 ipm is specified then the metal removal rate, to repeat, will be 27 cubic inches per minute, which at the K factor of .75, results in a power consumption of approximately 27 hp.

The K factor of .75 was chosen instead of .5 to account for the increased power required when the bar (and cutter) are working 40" away from the table. But the average distance from the bottom arc of the circle to the top is 20" and hence the average K factor can be put down as .625. This results in a power consumption, assuming the use of 15 ipm as the feed rate in both directions, of approximately 24.75 hp. Since this is less than 20% overload, and since such overload is imposed on the machine for such a short duration, it is estimated to be entirely within reason.

The feed and speed and other vital statistics of this operation are:

Speed: 140 rpm, the nearest on the dial to the speed required for 300 sfm

SFM: 300

Chip load: approximately .014"

Metal removal rate: min. 27; max. 39 cu. in. min.

Feed: 15 ipm min.; 22 ipm max.

Total cutting time with carbide: 10 minutes.

Total cutting time with H. S.: 50 minutes.

Finish: 30 micro-inches

Tolerance: within limits for both flatness and accuracy.

If this operation were performed on a machine having a 50 hp spindle, the feed rate would be increased by approximately 2½ times or 37 ipm; the chip load would also be increased correspondingly, or .035". The cutting time would be reduced from 10 minutes to less than 4 minutes.

If such a workpiece came through in sufficiently large job lots the designation and use of a 50 hp spindle would be justified.

The End.

Why . . . Where . . . How Dust Control in Metalworking Shops

By **James R. Kayse**, Supervising Engineer
Dust Control Products
American Air Filter Co., Inc.
Louisville, Ky.

SHORT-CIRCUITING of electrical equipment, excessive wear on machine tools, additional housekeeping, poor labor relations and in some cases health hazards are a few of the results of inadequate dust control in a metalworking shop. To be sure, the majority of shops are well aware of the dust hazards and have (or are doing) done something about it; however, due to the accelerated production schedules of American metalworking industry many dust control installations are laboring mightily to fulfill their functions to the fullest. It must be remembered that the success of any industrial exhaust system is proportional to the effectiveness of the exhaust hoods and proper selection of necessary air volumes. Table 1 illustrates the recommended exhaust volumes for some of the more common equipment encountered in metalworking. These recommendations were specified by the American Foundrymen's Society and adopted by the American Standards Association.

Grinding, Buffing, Polishing and Abrasive Cut-Off Wheels

In any grinding application, heavier

particles are torn from the work by the rotating wheel and are thrown tangentially with a high velocity from the point of release. It is necessary to direct this throw towards the hood, or stop the travel by a shield, or deflector, if such particles are to be picked up by an exhaust system.

Variations in the design of this hood will be required, depending upon the type of grinder used and the part finished. The hood is of heavy construction to act as a guard in case of wheel breakage. To prevent small parts and large chips being carried through the exhaust system, a trap is incorporated in the lower part of the hood. For operations other than grinding or polishing wheels, the selection of capture velocity, air volume and type of hood will depend upon the knowledge and ingenuity of the designer. Table 2 will aid in the selection of capture velocity; the location and size of the hood will determine the air volume based on this velocity.

For stand and pedestal grinders, buffing and polishing wheels and belts, abrasive cut-off wheels, the recommendations shown in Table 1 will be sufficient

for the usual operation. For other than usual operations, such as opposite wheel rotation or the finishing of long strips and tubes where the under side of the wheel is used, the conventional hood surrounding the wheel is ineffective because most of the generated dust follows the long surface making it difficult for the air stream to pick up the dust particle before it has passed the zone of effective capture velocity. Use of "dog

houses" or "garages", as shown in figure 1, often solve this problem effectively. Where very high peripheral speed buffing is employed or where air cooled buffing wheels are used, it is recommended that volumes shown in Table I be increased by 100%. Volume increase of 50% is good practice on grinding, polishing, and buffing applications, where the trajectory of the dust stream cannot be directed into the hood or

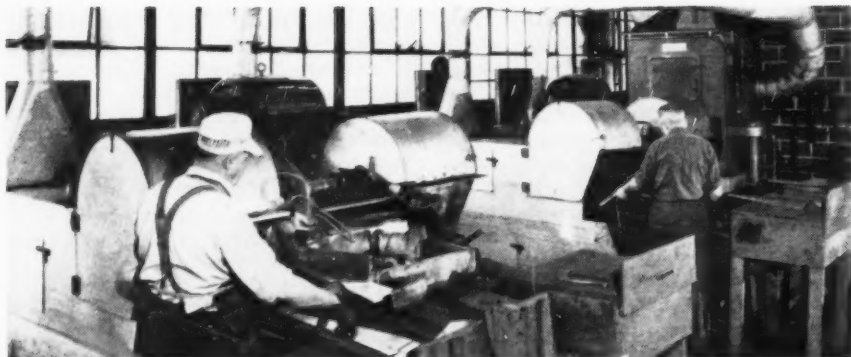
Table 1—Exhaust Requirements for Grinding, Polishing, Buffing, Scratch Brushing, Abrasive Cut-off Wheels, Grinding and Polishing Belts

Air Volume, 4,500 f.p.m. in all branches:
2-inch suction at average hood

Wheel Diameter, Inches	Max. Width* Inches	Branch Diameter Inches	CFM
Grinding or Cut-off Wheels			
Through 9	1½	3	225
Over 9 through 16	2	4	390
Over 16 through 19	3	4½	500
Over 19 through 24	4	5	610
Over 24 through 30	5	6	880
Over 30 through 36	6	7	1200
Buffing, Polishing and Scratch Brushing			
Through 9	2	3½	300
Over 9 through 16	3	4½	500
Over 16 through 19	4	5	610
Over 19 through 24	5	5½	740
Over 24 through 30	6	6½	1040
Horizontal Single Spindle Disc Grinders			
Through 12		3	225
Over 12 through 19		4	390
Over 19 through 30		5	610
Over 30 through 36		6	880
Horizontal Double Spindle Disc Grinders			
Through 19		1-5	610
Over 19 through 25		1-6	880
Over 25 through 30		1-7	1200
Over 30 through 53		2-6	1760
Over 53 through 72		4-8	6240
Vertical Single Spindle Disc Grinders			
Through 20		1-4½	500
Over 20 through 30		2-4	780
Over 30 through 53		2-6	1760
Over 53 through 72		2-8	3120
Grinding and Polishing Belts			

To 3-inch wide, 3-inch branch. Add ½ inch to branch diameter for each 2-inch or fraction increase in belt width over 3-inch.

*Increase branch diameter 0.3 inch, but not less than ½ inch for each 1 inch increase in width over dimensions noted.



1. An example of hooding using "dog houses" or "garages."

against a deflector or shield due to size or shape of the part being finished. ,

For portable and flexible shaft grinding and polishing, there are four methods of effective control: local hood, down draft bench, booth enclosure and room enclosure.

Local Hood: Local exhaust hoods effectively located will give good control with exhaust volumes in the order of 200 to 500 c.f.m. Effective control, however, depends on frequent relocation of the hood and the directing of generated dust into the hood mouth. This type of hood has not proven practical because of the human element of hood location and the frequent positioning required.

Down Draft Bench: Where size of parts permit working on a bench, figure 2, a grilled bench top is practical. 150 to 200 c.f.m. per square foot of gross grill area is pulled through the grill into a plenum located under the bench. This plenum, from which the exhaust duct runs, acts as a trap, collecting large pieces, tools and foreign material and at the same time aids in distribution of the exhaust volume over the entire bench.

Booth Enclosure: Where parts finished vary considerably in size, the booth type of enclosure is usually selec-

ted. Air flow in the order of 75 to 100 f.p.m. laterally through the cross section of the booth will carry fine dust to the exhaust opening; allowing the coarser particles to drop to the floor. The basic disadvantage is the problem of moving heavy parts in and out of the booth.

Room Enclosures: Where the booth enclosure is impractical, a room surrounding the operation is often the solution. An exhaust hood or hoods located as near the operator as possible, with indraft of 100 to 150 f.p.m., will provide control. Under no condition should the exhaust volume be less than one air change per minute.

Branch duct velocities of 4500 f.p.m., are recommended and will provide the usual state code requirement of 2" hood suction. Reduction to 3750 f.p.m. in the main duct will provide ample conveying velocity, give better distribution among various branches and lower pressure loss for the exhaust system.

A dry dynamic or centrifugal dust collector will provide adequate dust control for this particular group provided recirculation is not required. For recirculation on normal grinding or abrasive cut-off wheels it would be necessary to use a cloth collector, wet collector or use a viscous or oil bath aftercleaner to the dry centrifugal. For

Table 2—Indraft Velocities for Hoods and Conveying Velocities in Ducts

INDRAFT VELOCITIES		
Air velocities recommended through openings in hoods enclosing operation or over zone of dust generation.		
Method of Generation	Usual f.p.m.	Typical Processes
Released without noticeable movement	50-100	Evaporation of vapors; exhaust from pickling, washing, degreasing, plating, welding.
Released with low velocity....	100-200	Paint spraying in booth; inspection, sorting, weighing, packaging; low speed conveyor transfer points; rotating mixers, barrel filling.
Active generation	200-500	Foundry shakeout; high speed conveyor transfer points; crushers, screens.
Released with great force.....	500-2000 and higher	Grinding; tumbling mills; abrasive cleaning; metal working.
CONVEYING VELOCITIES		
Material Conveyed		Conveying Velocity in Ducts—f.p.m.
Vapors, gases, fumes, very fine dusts		1500-2000
Fine dry dusts		3000
Average industrial dusts		3500
Coarse particles		3500-4500
Large particles, heavy loads, moist materials, pneumatic conveying		4500 and higher

high speed mass production grinding, causing a heavy dust load, ventilation to the atmosphere is generally recommended. Efficiency of the dry centrifugal will range from 50 to 97% depending on the type of collector. Efficiency of the cloth or wet collector will be better than 98% by weight.

Machine Tools

Machining operations, using such equipment as the lathe, boring machine,

drill, etc., on cast iron parts and gear grinders, screw machines, bolt makers, hob grinders, centerless grinders etc., in which oil is used as a coolant, are the primary operations in which airborne contaminants are released to the workroom. As the methods of control for these contaminants are slightly different they will be treated separately.

Cast Iron Dust: Control of cast iron machining dust is receiving more attention as machining speeds have increased



2. Downdraft benches, often with turntables, where heavy parts are finished, are the most frequent answer to portable grinding dust control.

and the use of multiple operation machine tools has increased the concentration of fine dust generated per unit of floor space. The removal of this fine floating cast iron dust by local exhaust hoods has resulted in outstanding improvement in cleanliness of the worker and workroom.

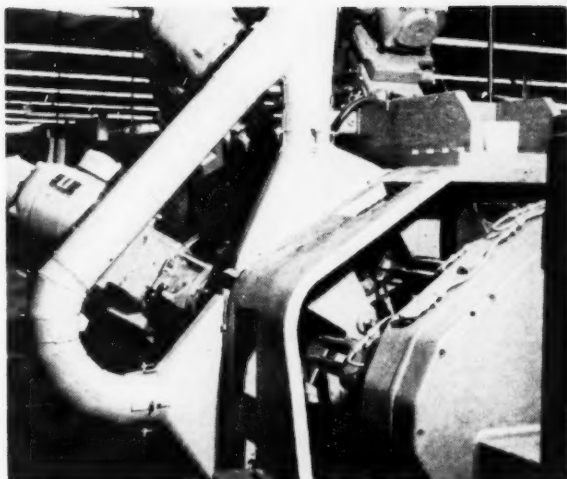
Hood design, figure 3, is often a compromise between the designed hooding around the dust source and a remotely located hood necessary for visibility by the operators, movement of the machine tool parts and the placing or the removal of the work. Modest exhaust volumes will effectively control the light dust concentrations and their small particle size without picking up the chips generated by such operations. Small hoods with face velocities of 400 to 2000 f.p.m. can be designed and located after watching the operation and dust source. Branch sizes of 4" to 6" exhausting 400 to 800 c.f.m. will be sufficient. At times it will be possible to enclose much of the open area when

multiple operations are involved. The indraft required is 100 to 150 f.p.m. through the remaining openings to obtain the necessary exhaust volume.

Efficiencies in the order to 70 to 80% on the float dust fraction can be expected with a dry centrifugal. Higher efficiencies, plus 99%, and the ability to recirculate are usually accomplished by using an oil bath aftercleaner to the centrifugal. Central systems are usually used because the air volume per machine is low and due to the large number of machines located in a relatively small area, it is more economical to exhaust in this manner.

Oil Mist, Smoke and Vapors: The tendency to use oil as a coolant for high speed finishing has generated the problem of controlling the resulting oil mist, smoke and vapors. Oil haze in the workroom, condensation on the floor, a safety hazard, and condensation on the walls and ceiling, a fire hazard, are the results when local exhaust ventilation is lacking.

3. This Ex-Cell-O special machine for drilling, reaming, counterboring and tapping uses two 5" branches and 1200 c.f.m.



Operation of the machinery and observation of the operation are primary considerations when designing and locating the exhaust hood. Hood sides must act as splash guards because an indraft of air will not stop the oil throw from the operation. Plastic enclosures, figure 4, designed so the operation can be observed and providing accessibility to the machinery, have proven very effective for this application. When using a complete enclosure, an exhaust volume of 600 c.f.m. from the top of the hood is suggested to confine the mist and vapors and prevent their escape-ment to the room.

For most machine tools, an exhaust volume of 400 to 600 c.f.m. will provide the recommended 100 f.p.m. indraft. This indraft velocity, good hood construction and optimum location will prevent the vapor and mist from dispersing. Where considerable heat is generated or where hooding has been compromised, effective control may require as much as 1000 to 1500 c.f.m.

Due to the nature of the contaminants, conveying velocities in the ducts of 2500 f.p.m. are ample. Duct joints should be tight and the ducts, contain-

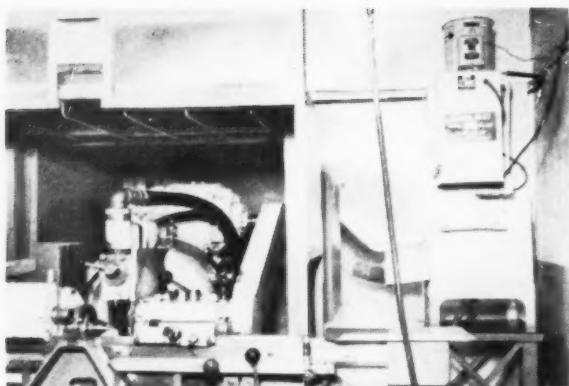
ing traps, should be pitched to allow condensed mist and droplets to drain back to the machine tool or to the oil container.

A small unit type electro-static precipitator is the usual selection for collecting oil mist, smoke and vapors. The air volume exhaust per machine and the capacity of the collector will determine the number of units to be exhausted by one collector. Usually there is one per machine tool, with the advantage of locating it near the source, thereby eliminating extensive duct work. Efficiencies of 99% or greater enables recirculation.

Metal Cleaning

Two of the principal methods of metal cleaning are acid cleaning and solvent degreasing. Both of these operations, unless adequately exhausted or inhibited, are health hazards to the operators.

Acid Cleaning: Pickling tanks are the primary sources of irritants for this particular method of metal cleaning. Acids, such as hydrochloric, phosphoric, chromic, sulfuric, etc., are used in water solutions and their corrosive action on



4. Counterweighted, transparent, front side of hood is easily raised and lowered at the start of each operation.

clothing and machinery plus the splash hazard are well recognized.

A slotted side hood or hoods is the preferred method of providing effective control of open surface tanks. If the width of the tank is 20" or less, a slot on one side is sufficient. For widths of 20" to 36", slots on both sides are desirable and for widths greater than 36", slots on both sides are necessary unless all other conditions are optimum. A slot velocity of 2000 f.p.m. with an air volume in the order of 50 to 100 c.f.m. per square foot of open tank surface area is recommended. For enclosed tanks, 100 to 150 c.f.m. per square foot of open area will be sufficient. Duct velocity of 2,000 to 2500 f.p.m. will provide adequate conveying velocity.

Normally a fan is used to exhaust the acid mists and vapors to the outside. In the event that collection of the effluent is necessary, a wet scrubber or collector, properly protected against corrosion is the usual choice. Under no condition is recirculation practical even though the efficiency of the unit will be 90% or greater.

Solvent Degreasing: A degreasing machine has essentially four component parts: a heated chamber in which a grease solvent is boiled, space above this for hot vapors, a condenser for cooling and condensing the vapors and

side plates to minimize air currents. A properly designed and operated degreasing unit located in a room over 20,000 cubic feet in volume will not require local exhaust ventilation. Five common causes of exception to this rule are: cross-drafts, mechanical displacement of the solvent vapor, improper operation of the condenser, excessive speed in lowering or raising the parts and carry-out of liquid solvent by not allowing sufficient drying.

Local exhaust ventilation, based on the same principals as the slotted hood for acid pickling tanks, can be provided where necessary. Air volumes of 50 c.f.m. per square foot of tank area are sufficient. If parts are removed wet, a down-draft grille for drying with a velocity of 50 f.p.m. will be ample. A conveying velocity of 1500 to 2000 f.p.m. should be used in the duct.

For this particular application, an exhaust fan will be used to deliver the air to the atmosphere. Collection is not feasible since the contaminant is primarily a vapor and the amount of dilution present in the exhaust system should eliminate any possibility of atmospheric pollution.

Metalizing

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THE **Hamilton** TOOL COMPANY

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a spray gun using a hydrogen or acetylene torch to melt the metal, which is in the form of wire. Compressed air is usually used to atomize and spray the metal on the surface to be coated. A health hazard may exist due to the airborne particles of sprayed metal and its oxides.

The metal atomized, exit velocity and volume of the spray gun gases, size and shape of the sprayed surface, shape and size of enclosure opening determine the ventilation requirements. A metalizing booth is usually provided when spraying toxic metals. The work bench is provided with a grill top and a slotted hood, with slot velocity in the order of 1,000 f.p.m. is mounted to the rear of the bench. An air volume of 200 c.f.m. per square foot of open face area is ample; a conveying velocity of 3,000 f.p.m. as a minimum should be used. For a local exhaust hood, air volumes in the order of 200 c.f.m. per square foot of hood opening with a duct velocity of 3,500 f.p.m. minimum will be ample.

A dry dynamic or centrifugal collector will provide 70 to 97% efficiency; efficiencies of 95% plus can be obtained with a wet collector or cloth arrester. The possibility of toxic metal fumes and gases in the collector effluent prevents recirculation for most operations.

Welding

Local exhaust ventilation is normally recommended unless the room volume is over 50,000 cubic feet and the space per welder is over 10,000 cubic feet. A portable exhaust hood is normally used with air volumes depending upon the distance that the hood is located with respect to the welding rod. If this distance is 6", an air volume of 250 c.f.m. is recommended, 400 c.f.m. for 9" and 1,000 c.f.m. for 12". If a down-draft grill is used, volumes based on 250 c.f.m. per square foot of grill area are sufficient. For a booth type enclosure, an indraft velocity of 100 f.p.m. is recom-

mended. In all cases, the conveying velocity should be 3,000 f.p.m. minimum.

Small unit type centrifugals with aftercleaners have been used extensively for intermittent welding operations. For production line welding, a central exhaust system is normally supplied using an exhaust fan to deliver the air to the atmosphere without the use of a collector.

The End

Please mention MACHINE and TOOL BLUE BOOK when answering advertisements. For additional information about services and products please use the handy Reader Service Card on page 64.



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Metalworking Plant Squeezes "Juice" From Scrap—Operation Returns a Profit

By James Joseph

WHAT'S MORE economical for a machine shop: (1) toss out your scrap cuttings and the cutting oil along with them; (2) squeeze out the "juices," and recover the oil?

Los Angeles' Parker Aircraft Co., for one, squeezes cutting oils from its aluminum and steel chips—and pockets the profits.

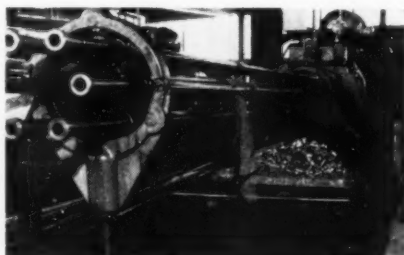
There's an old argument, of course, whether machine shops should bother with metal chips. Whether the tailings from such production units as turret lathes and milling and drilling machines should be plant-processed or simply dispatched to the scrap buyer as is. If it's decided to wring out scrap, where's the economic break-even point?

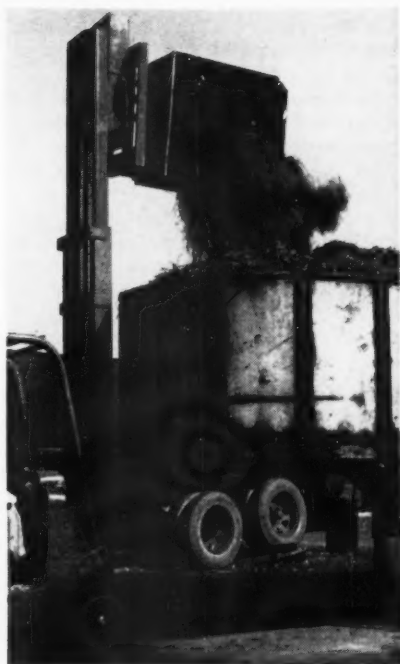
Parker, with a weekly scrap production of 50,000 pounds, says "wring them out." Purchasing agent Carl Bills, the man behind the statistics, says economies shape up like this:

The plant's primary scrap consists of C-1137 carbon steel chips and 24 and 17 ST aluminum shavings. 20,000 lbs. of steel scrap are produced weekly; almost 30,000 lbs. of 24 and 17 ST aluminum, both types being co-mingled. From each 500-lb. batch of steel chips, centrifuges (setup in the plant's salvage yard) recover about 8 gallons of oil. The proc-

ess continues throughout the working day, with 10 batches being handled hourly. Thus the oil recovery rate reaches 80 gallons an hour. With new oil ranging from 33 to 90 cents, and averaging about 40 cents a gallon (this is cutting oil, not lube oil), the monetary recovery is about \$32.00 an hour, \$256.00 a day. And this from steel chips, which absorb more oil than aluminum. Actually, with the price of steel chips down to about one cent a pound, the entire process is based upon oil recovery, since carting away consumes most of the scrap revenues.

Cuttings from battery of machine tools fall into individual mobile bins, which are picked up by forklifts, carried to salvage area.





Semitrailers automatically "segregate" chips, now squeezed dry of oil and cooling fluids. Each trailer takes different type of chips. When full, salvage company backs a tractor under trailer, hooks up, and carts metal away.

On the other hand, aluminum chips and tailings are centrifuged not so much because of oil recovery as to wring out the aluminum, which fetches about 10 cents per pound. Scrap dealers pay higher prices for wrung out scrap. This is because the usual price is based upon weight less moisture. The moisture content is determined by sampling, the sampling data notarized. Before Parker took to wringing its scrap, samples showed 50% moisture. That is, 50% of the weight was cutting oil. Not only was the oil being wasted, but it was expensive carting so much dead-weight to

the scrap buyer. A load which weighed-out 6000 lbs. at Parker, really contained only about 3000 lbs. of scrap. And that is all the company was paid for. The scrap dealer had no way to recover the oil. Yet sometimes the oil was more valuable per truck-load than the metal.

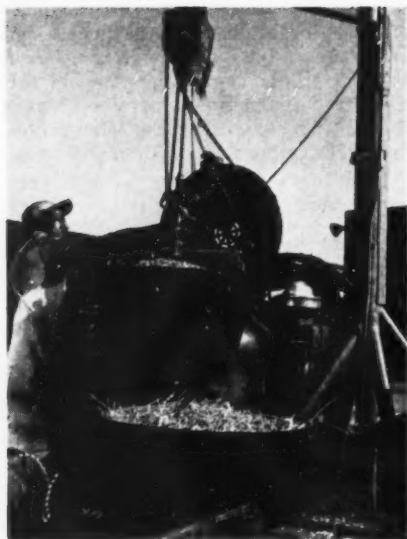
Look to your own shop. Look to your own machines. Have you ever sent samples of your chips out for moisture-analysis? You might be surprised to find that you are discarding dollars with every shipment to the scrap man.

Today, with centrifuging, Parker recovers a tremendous amount of oil—and its scrap is showing less than 21% oil content. This is a two-way savings which metalworkers can not overlook. And the savings can be substantial even with much smaller quantities of scrap.

Parker's scrap handling represents several economies: (1) paramount, of course, is the recovery of thousands of gallons of cutting oil, which is filtered, then either returned to a 10,000-gallon

Chips are weighed, then loaded into centrifuges.





One man can handle loading, unloading of both centrifuges.

underground used-oil sump, or barreled. Most plant machines use barreled lubricants, so Parker finds this most expedient; (2) Parker is fortunate in that its scrap dealer furnishes semitrailers, which are parked near the scrap recovery area. The trailers effectively segregate the metals. So the company need construct no large scrap holding bins; (3) whereas aluminum chips once sampled 50% moisture, centrifuging has removed 29% of the moisture, reducing over-all oil content to just 21%. Thus, scrap dealer gets a more nearly "pure" product. And the monetary return, for the weight leaving Parker's yard, is more nearly the actual load's worth; (4) metal drying or spinning process is fast and efficient. Usual 5-minute spinning cycle per batch allows 4250 lbs. to be wrung dry per hour.

Operations: Automatic machines, especially those equipped with screw or

belt conveyors, deliver scrap cuttings directly to box-like steel bins. Bins are placed near each turret lathe and milling machine. Bins are equipped with wheels and with fork-lift slots. Usually they are the double-bottomed type, the lower section forming a sump into which excess oil drains through a metal-mesh screen. When these smaller, mobile bins are full (each has a capacity of three cubic feet), they are picked up by forklifts and trundled to one of two centrifuges in the scrap area.

Parker's largest centrifuge has a capacity of 425 pounds; the smaller, a capacity of 225 pounds. Above each is a hoist (capacity $\frac{1}{2}$ ton) suspended from a boom. Bins are manually emptied into the centrifuge's spinner, the spinner is hoisted into the unit and the top is locked. Cutting oil flows into a 300-gallon sump, from where it runs through a National-Acme filter, thence is either barreled or stored in a 10,000-gallon underground used-oil tank.

Wrung-out scrap is fork-lifted to one of the semitrailers parked nearby.

Three men handle Parker's 50,000-pound weekly scrap volume.

The chart below illustrates why oil recovery is a two-fold solution to the metalworking plant's scrap problem: (A typical price list—what dealers offer you for scrap)

Aluminum castings ... 35S, 356, 32S, 750	
10 cents per lb.	
Aluminum solids 14S, 17S, 24S	
10 cents per lb.	
Steel solids \$30 a ton	
($1\frac{1}{2}$ cents per lb.)	
Steel chips \$10 per ton	
($\frac{1}{2}$ cent per lb.)	
Bronze chips 10 cents per lb.	
Bronze solids 11 cents per lb.	

It is pretty obvious from this pricing that recovery of cutting oil, which averages 40 cents a gallon, is more important than the chips—but only in steel. Aluminum is far more valuable in itself than for what oil may be recovered.

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*Simplest and quietest
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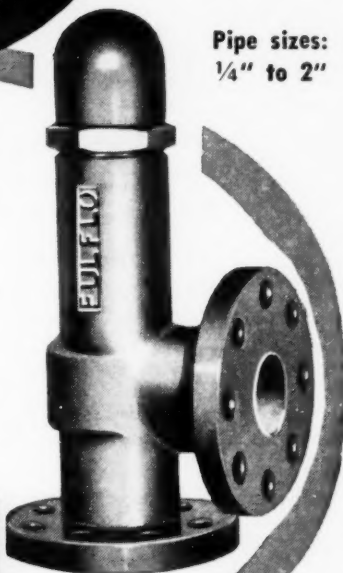
No maintenance needed.

For ram presses, machine tool hydraulic
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because the cylindrical piston does
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THE FULFLO SPECIALTIES CO. Inc.
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Coolants are "squeezed" from machining chips by centrifuge at Parker Aircraft Co.

Recovered cutting oils at Parker are strengthened by new oil and additives and used almost continuously, again and again, and at great economies.

Much depends, of course, on current scrap markets. Sometimes steel scrap is more valuable in itself than for what oil can be recovered. Sometimes it is the other way around. Right now aluminum and some other metals are dear, and lubricant recovery is not the prime objective, although centrifuging betters the condition (and thus price) of the scrap. Current conditions must govern decisions.

The End

Incentive Management

By James F. Lincoln. Published by The Lincoln Electric Co., Dept. BB, 22801 St. Clair Ave., Cleveland 17, Ohio. Cloth Bound; 288 pages. Price, \$1.00.

SELDOM DOES a work such as this come along, that can be read profitably by management and labor alike, that isn't mostly theory and wishful thinking.

Lincoln recognizes and helps attain each individual's desire for recognition, for praise, pride of accomplishment, applause when warranted, and other elements. Giving public recognition to the worker for his skill and achievement and thus enhancing his standing in his own eyes and in the eyes of his fellows, guarantees any such plan's success. The theme of the book could easily be "... how to tap the unused reserves of the individual's energies, one of the greatest potentials in the world." Too often such energies are tied up in a resentful attitude toward management. Mr. Lincoln tells those at the top to stop thinking of those underneath as just a mass of people,

animals or children that they must be kind to and take care of and on the other hand as if they were sullen and rebellious, inferior classes. They must be seen as similar beings with the same troubles.

Lincoln is fully aware of the dignity of the individual and strives to develop his latent talents to the maximum under this free enterprise system. As he has so aptly proven, if the individual is encouraged to grow, develop and utilize his latent abilities, he will provide new and better machines, new comforts and higher and higher standards of living, an apt answer to Communist nonsense that private industry must be regulated by the state. An incentive that comes from virtual partnership on the part of the employees, financially, results in teamwork, endeavor and efficiency that will always win out in the long run against that carried out under force, threat, or fear.

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Taps can be changed in a few seconds, in two operations—
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Right or left hand tapping

Can be used on rotating or non-rotating positions

Floats tap into hole

3/32" length of pull-out to release

Uniform depth of thread regardless of feed

Solid shanks for strength

Floating back jaws compensate for off-center tap squares

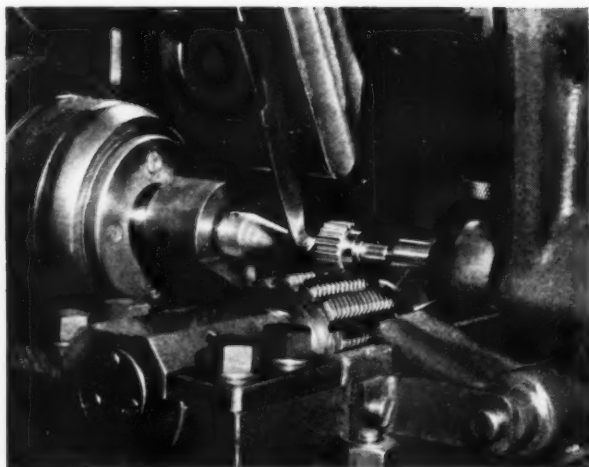
Threading operation can stop and start at any point
without difficulty or shock

Send for leaflet giving more detailed information about
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COMBINE ACCURACY and PRODUCTION

on your HOBGING OPERATIONS

Barber-Colman Hobbing Machines have a basic design which makes it possible for them to be easily tooled to give the required accuracy at the desired production rate. Each job is considered individually to provide maximum efficiency according to your specifications. The machine and tooling are combined to give you maximum production commensurate with the desired accuracy.

An example of the tooling which is available for high-speed hobbing is the high-speed hob swivel with speeds as high as 1800 rpm. Although most jobs cannot utilize these high speeds, this swivel can increase production considerably under the proper conditions. Multithread hobs, quick-acting tooling and automatic loading can also be applied to many high production jobs.

For maximum accuracy, special precision No. 6-10 and No. 16-16 machines are available. These machines are equipped with single-thread index worms to provide maximum tooth spacing accuracy, and the relative rotation of the hob and work spindles is held to precision tolerances. These machines equipped with Barber-Colman Class AA hobs are capable of cutting the very finest hobbled gears at relatively high production rates. Whatever your hobbing problems may be, Barber-Colman has the equipment to satisfy your needs.

B U I L D E R S O F P R E C I S I O N G E A R

ACCURACY

This 26 D.P. 7-tooth pinion has an outstanding record for both accuracy and production on a Barber-Colman No. 6-10 Hobbing Machine. The feed is .050" per revolution of the work spindle. Speed of the 2" diameter hob is 533 rpm cutting B 1113 steel with a double-thread hob. Cutting time for the $\frac{3}{4}$ " face width is less than ten seconds, and 18,000 pieces are obtained per sharpening of the hob. The maximum adjacent tooth spacing error is .0002", and concentricity is easily held within the tolerance of .0015".

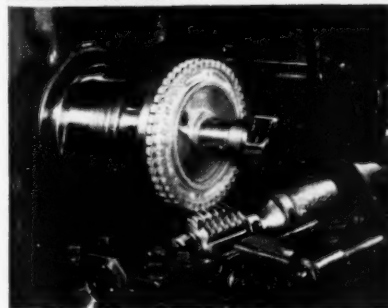
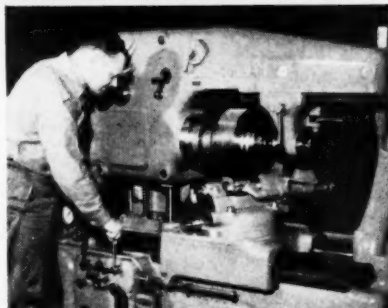
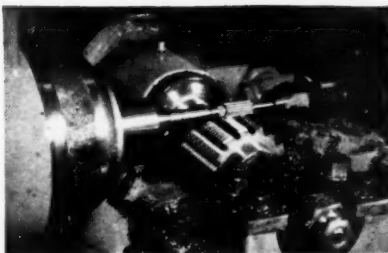
PRODUCTION

Semi-finish hobbing of these 8 D.P. change gears with 84 teeth is accomplished on a Barber-Colman No. 14-15 Hobbing Machine with a feed of .075" per revolution of the work spindle. With a five-thread hob, the cutting time per load of two with a 4" face width is 16.6 minutes. Using a single-thread hob on this job required a cutting time of 66 minutes per load of two. Therefore, although the hob speed is only 105 sfm on a NE8749 steel blank, cutting time was reduced by 75% while maintaining the required accuracy.

SPECIAL FORM

Form accuracy of the slots on this wheel is important. Hobbing generates the slots with straight and parallel sides having no taper and a minimum undercut of .0005". Spacing accuracy of the Barber-Colman No. 6-10 Precision Hobbing Machine holds the accumulated spacing error for the 45 slots within .001". Production is five wheels per hour as compared with two per hour by the previous method.

For a quotation on your specific job, call your nearest Barber-Colman representative or send us a blueprint with the desired tolerances and production.



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BOTH WET AND DRY MODELS

Capacity—10" rounds, 18" flats
Motor— $\frac{1}{2}$ H.P. Ball Bearing any voltage
available, single or polyphase ($\frac{3}{4}$ H.P.
on wet machine).
Wheel Diameters—16".
Floor Space—66" x 31".
Bed—11" wide, 44" long, 6" deep, 24" high.
Overall Height (Closed)—39".

SPECIFICATIONS—MODEL J

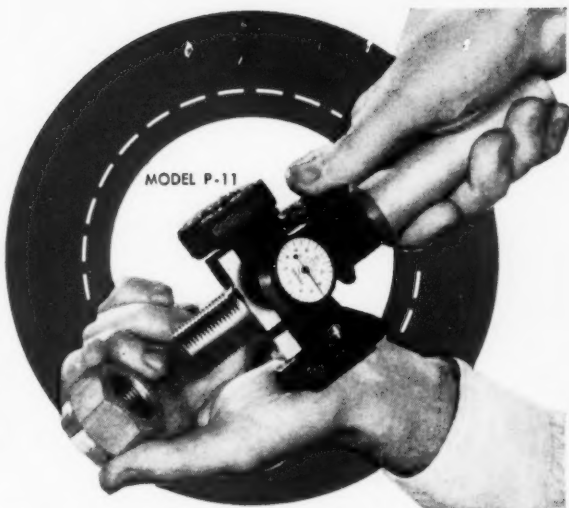
Blade Length—11'5" x $\frac{3}{4}$ " x .032" All
Standard blades of these specifications
can be used.
Weight—Approximately 750 lbs. Crated
800 lbs. Boxed for export 875 lbs.
Speeds—35, 90, 130, 190 feet per
minute.
Casters—Optional at slight extra cost.

MODEL B, 5" x 10" CAPACITY ALSO AVAILABLE

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BRYANT GAGE FOR INTERNAL THREADS



The P-11 is a portable comparator gage. Variation from basic size of pitch diameter, form and lead are shown in a single reading on the dial indicator accurate to .0005". Interchangeable pairs of segments inspect all classes of threads in a range from 5 1/16" to 5" diameter.

The gage segments work on the principle of an expanding master plug. A thumb lever collapses one segment so that the part can be loaded. When the lever is released the segments engage the thread. The movement of one segment registers on a precision dial indicator which shows the accumulated amount of variation from basic size. The segments are made to the same tolerances in P.D., form and lead as a class "W" master. The segments are attached by four screws. Periodically the segments are checked to a master ring gage and the "0" setting of the indicator is adjusted accordingly. Worn segments may be returned to the factory to be reground. Dirt or cutting oil cannot affect the working parts of the gage as there are no slides or pivots. The indicator may be turned on the axis of the stem to keep the dial visible. This gage weighs only 14 oz. without the segments.

This gage is designed for use at the inspection bench or in the shop. It is used for quality control since complete control of the thread cutting process is possible. The indicator reading of variation from basic size tells exactly where within limits the work is running. For this reason also, the gage is used for checking tool wear in production jobs.

Please send descriptive literature covering the P-11 gage and other Bryant gages.

Bench type gages for external or internal threads are available, with or without squareness-of-face attachment.



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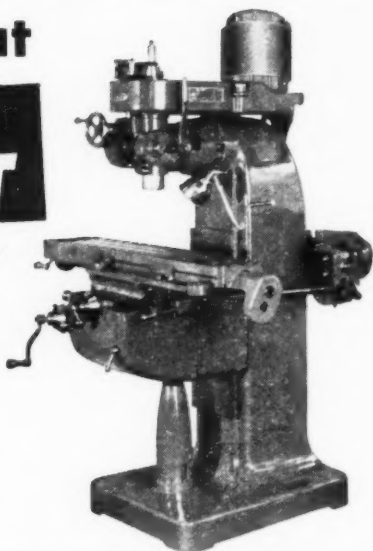
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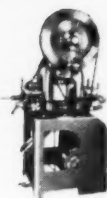
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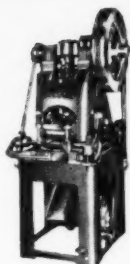
JACKSON, MICHIGAN



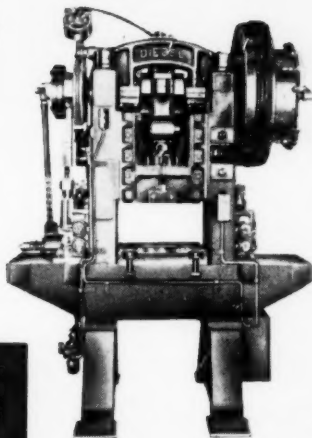
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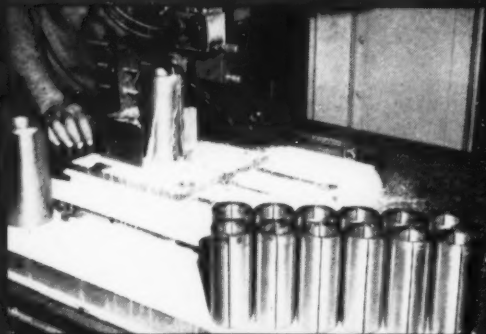
When considering presses, as much thought should be given to their precision accuracy as to that of the die.

Di Machine Corporation

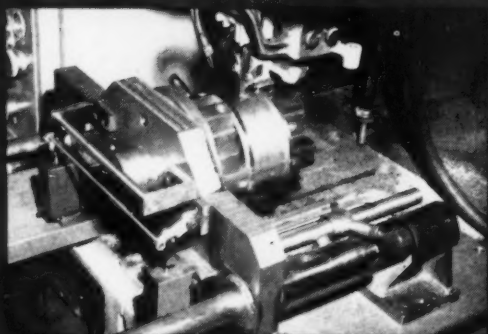
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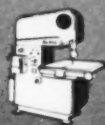
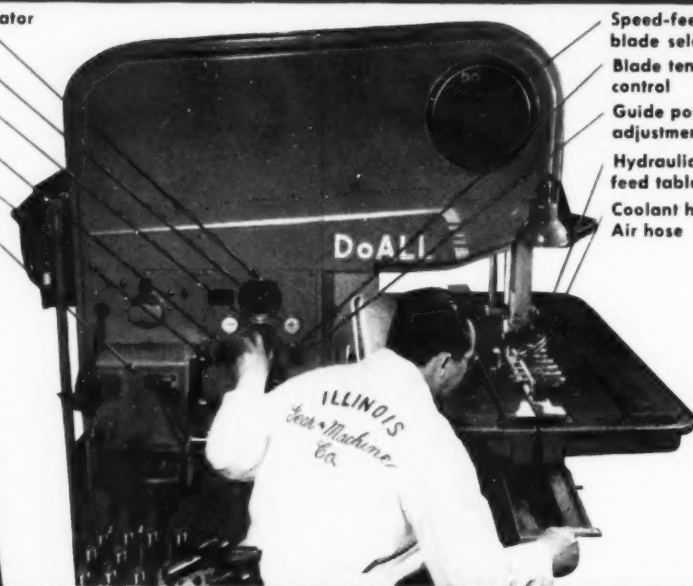
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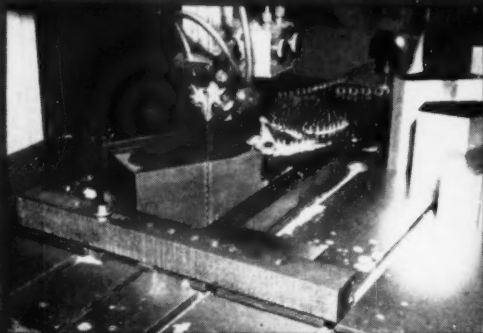
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How to Increase the Efficiency of Lathe Steady-Rests

By **Clifford T. Bower**, Consulting Tool Engineer

THE THREE-POINT lathe steady-rest is basically similar in design to what it was 70 years ago and has not progressed in step with modern lathe development. While the steady-rest is not designed for continuous use under production conditions, it is a fact that many firms find it has to be used for a wide range of their regular jobs and it is then that the short-comings of present-day designs become apparent. Some lathe makers have set about the task of designing a fairly efficient steady for use on their machines but it will be found that the best designs are confined to expensive lathes of large capacity and that the smaller the lathe, the more rudimentary will be the steady supplied with it.

Lathe steadies which are extremely simple and low-priced, such as are fitted to small lathes, can be improved in performance by a few simple modifications, thus increasing the output of the lathe. Two important factors which lathe operators have to account for

when doing steady-rest work are the provision of adequate lubrication at the point where the steady pads bear on the revolving work and the aligning of the work center line with the lathe spindle center line. Neglect of lubrication will cause scoring and discoloration of the revolving work, since the running clearance between the pads and the work periphery must be the absolute minimum. If the work is allowed to overheat it will expand in diameter and thus reduce the running clearance, causing seizure of the pads upon the work.

With regard to alignment of work and lathe center lines; long and thin work can be operated upon at the steady-rest end by the lathe cutting tools even if the two center lines are misplaced slightly in relation to one another. The result of this practice is the production of end faces which are not flat and the machining of holes which are not parallel throughout their length. Any experienced lathe operator

1. The pads of the steady-rest have been engraved on their front faces with lines spaced $\frac{1}{8}$ in. apart. Adjacent to each pad and engraved into the steady-rest casting is a line which is used in conjunction with the markings on each pad.

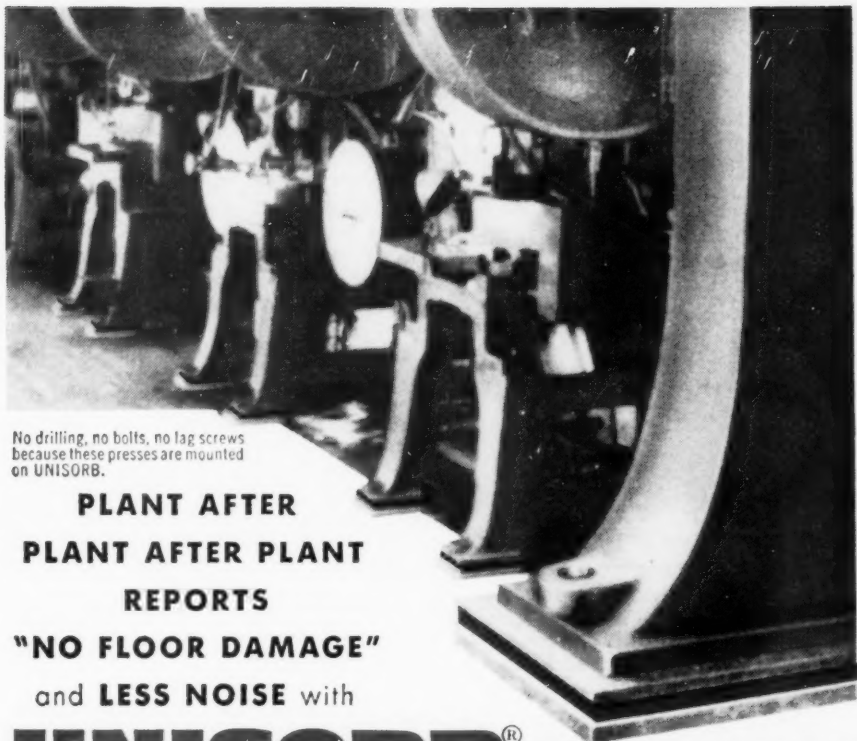


2. Method of engraving the lines on the pads.

The pads are gripped by two jaws on a four-jaw chuck and a pointed tool in the tool post is arranged so that it scratches the surface of the pad as this is swept past by pulling the chuck by hand through a short arc.

can correct the above faults after much "cutting and trying" but it is in the initial setting of the pads that a lot of time is wasted. It is not suggested that the small modifications to a simply steady-rest described here will enable

work to be set up with the speed equivalent to gripping it in a chuck, but they will knock a few seconds off the setting-up time and these will add up to an appreciable number of hours at the end of a year.



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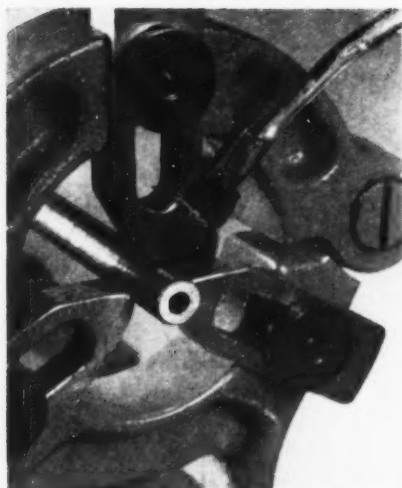
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3. A simple method of lubricating revolving work in a steady-rest. A small pad of felt is secured to one of the steady pads by means of a piece of wire. Oil drips on the pad from an oil can.

The steady-rest illustrated in figure 1 is probably the simplest design possible but the modifications applied to it have been tried out on much larger and more efficient types and have been found successful. The pads of the steady-rest have been engraved on their front faces with lines spaced $\frac{1}{8}$ in. apart. Adjacent to each pad and engraved into the steady-rest casting is a line which is used in conjunction with the markings on each pad. It will be apparent that if similarly placed lines on the pads are brought into line with the marks on the casting, the contact points of the pads will be placed reasonably concentrically with the lathe center line. Since the lines are spaced at $\frac{1}{8}$ in. intervals, work diameters in increments of $\frac{1}{4}$ in. can be set up reasonably concentric with the lathe axis, with a minimum of "cut and try" work.

The lines are really a series of concentric circles and if a divider point were placed in the center hole in the end of the work piece shown in place in figure 1, the other leg of the dividers could be arranged to intersect one of the lines on each pad.

Method of engraving the lines on the pads is shown in figure 2. The pads are gripped by two jaws of a four-jaw chuck and a pointed tool in the tool post is arranged so that it scratches the surface of the pad as this is swept past by pulling the chuck by hand through a short arc. The tool is fed into the work by means of the lathe top slide whilst the intervals of $\frac{1}{8}$ in. between lines are spaced by means of the cross slide feed screw and its micrometer dial. Duplication of the line spacing on each pad is ensured by using the outer jaw only for clamping and unclamping the pad in the chuck. The jaw on which the pad point bears acts as a location for each pad and is not moved during the engraving operation. The cross slide dial reading is noted carefully so that the first groove is always cut at a consistent distance from the pad point.

The lines of the steady casting are marked by the method suggested earlier—by using dividers. A truly centered piece of rod is placed in the steady and engaged with the lathe centers. The pads are brought to bear upon the rod periphery and are locked in place. The tailstock center is withdrawn from the rod and a pair of dividers with one leg in the center hole and the other fitting into a convenient groove on one of the pads is used to scratch the lines on the casting. These lines can be enlarged by means of a carefully placed chisel point.

On large steady rests, the concentric grooves on the pads have been stamped with figures indicating the diameter of the work placed therein. On small steady-rest, like the one illustrated, identification of the correct line to

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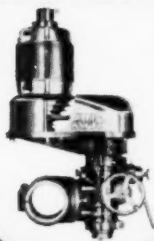
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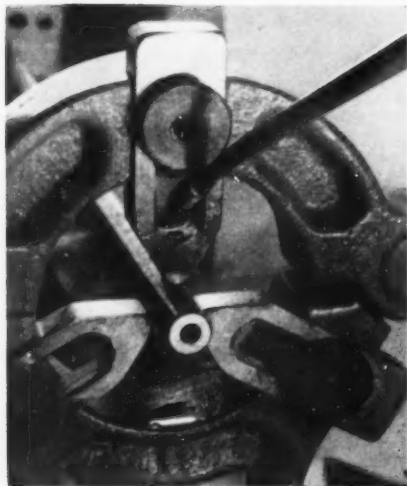
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4. An alternate method of getting lubricants to the right place is by drilling an oil hole into the top pad so that lubrication can be fed through the heart of the steady-rest pad and thus on to the work.

which the pad must be set is accomplished easily without the aid of figures. By using the graduations on the pads, work may be set centrally in the steady rest within about $1/32$ in. at the first attempt. With unmarked pads the operator can be $1/8$ in. or more out of alignment and have no indication that this has happened.

The importance of adequate lubrication for the revolving work was stressed earlier. In figure 3 is shown one very simple and successful method. A small pad of felt is secured to one of the steady pads by means of a piece of wire. Oil drips on the pad from a can. The felt stores up oil and feeds it to the revolving work under the wiping action obtained between them. If a thick or viscous oil is used on the felt pad, a rise in the temperature of the revolving

work will cause the lubricant to flow more freely from the pad. This method is very efficient for small work but is often difficult to apply to the smallest steady-rests. Often, the steady-rest pads are very close together when operating on small diameters so that there is insufficient space to accommodate the piece of felt.

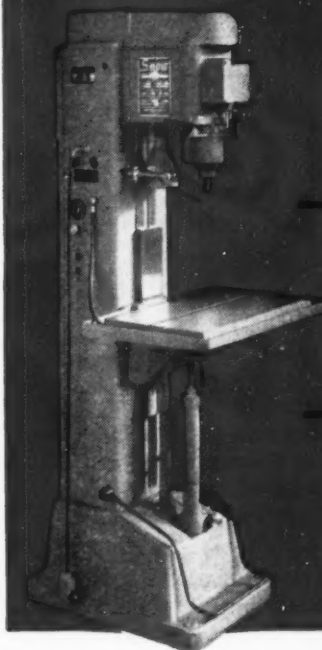
An alternative method of getting lubricant to the right place is shown in figure 4. Here, an oil hole is drilled into the top pad so that lubricant can be fed through the heart of the steady-rest pad and on to the work. Not all steady-rest pads are as conveniently shaped for this method as is the one illustrated. The same method has been applied successfully to solid pads by drilling the oil hole at an angle so that it intersects the center of the pad tip at one end whilst the outer end comes through the outer wall, where an oil can spout can be applied to it.

The advantage of feeding lubricant to the steady rest pad center where it bears on the work is that it has a chance to perform its useful function before being wiped off the work surface. Solid grease has been found to be a better lubricant than oil for steady-rest work. Where the oil hole comes through the side of the pad, a high pressure grease nipple is fitted in place so that a grease gun can be applied thereto. The oil hole in the pad becomes a reservoir for grease which lowers in viscosity upon a rise in temperature of the work taking place.

A successful variant of the grease method of lubrication suitable for continuous steady-rest work is to fit a screwdown grease cup to the oil hole orifice in the side of the pad. A good supply of grease is stored in the cup and can be forced down through the steady pad by giving a periodic turn to the cup.

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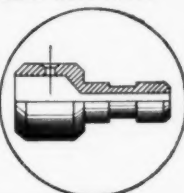
Crossdrill and C" T" Sink 1/16" Hole

Material—Brass

Production—4800 per hour

Fixture—# 15 Vertical index

Equipment—# 1-UD Drilling Machine



TAPPING

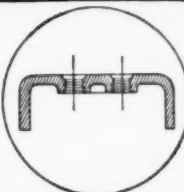
Tap Two #10-32 Holes

Material—Steel stamping

Production—3800 tapped holes per hour

Fixture—# 14 horizontal index

Equipment—# 1-UT tapping machine



THREADING

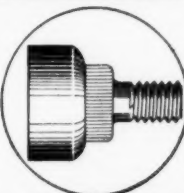
3/8"—24 Thread—1/2" Long

Material—Die Cast Aluminum

Production—2500 per hour

Fixture—# 10 Drum dial

Equipment—# 3-TR Threading machine



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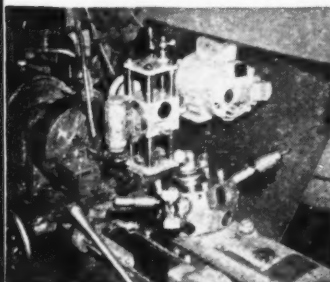
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| 3. Deep-Hole Internal Grinder Head | 8. External Grinder Head |
| 4. Basic Milling Unit | 9. Slotting and Keyseating Head |
| 5. Milling and Grinding Table | 10. Geared Dividing Head |

THREE SIZES

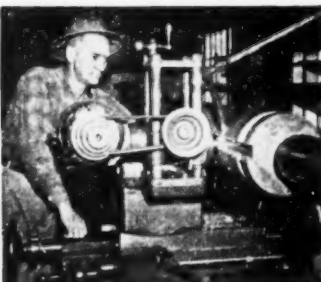
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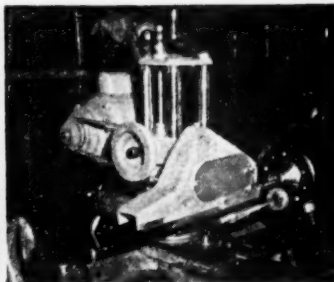
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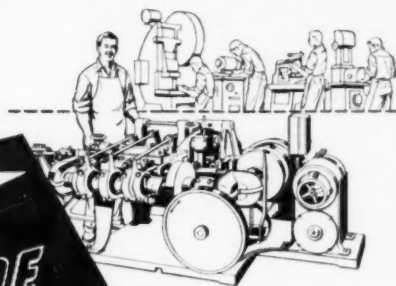
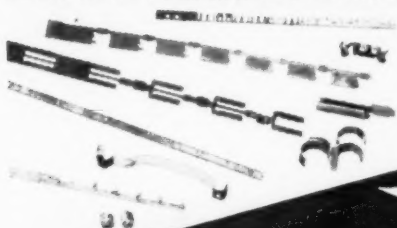
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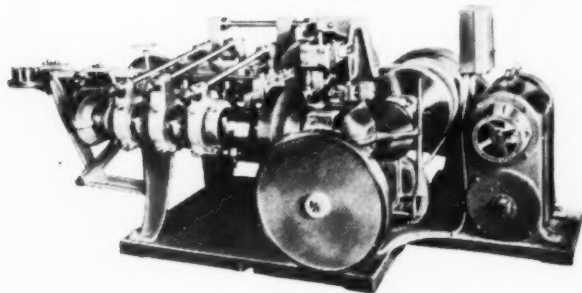
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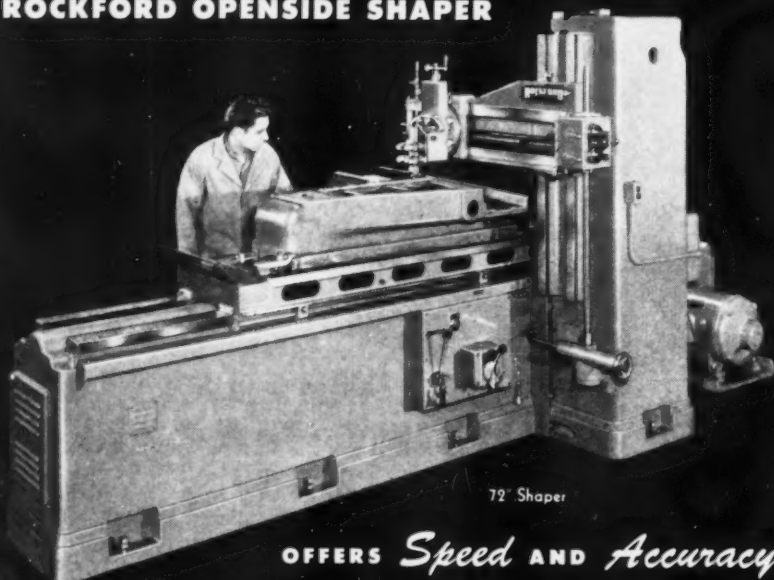
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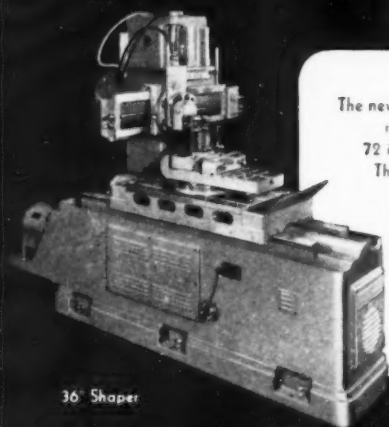
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Management-Labor Standards of Government Contractors

By **Robley D. Stevens, LL.B., J.D., LL.D.**

Management Consultant

YOU'VE PROBABLY never realized that the Walsh-Healey Public Contracts Act is one of the most underestimated in labor-management relations. Yet, during my former law-enforcement experience with the U. S. Department of Labor, I discovered a number of metal-working firms were not adequately informed on its basic requirements. As a result, unfortunately, they unwittingly operated in noncompliance and were sanctioned heavy penalties.

Any number of machine tools, equipment, materials companies have worked on government contracts under the defense program because they wanted to serve our country. However, in the way of explanation, the Walsh-Healey Act applies to "any contract made and entered into by an executive department,

independent establishment, or other agency of the United States, for the manufacturing or furnishing of materials, supplies, articles, or equipment in any amount exceeding \$10,000."

The stipulations provide that all employees, except those in a bona fide professional, administrative, or executive capacity (meeting the requirements of Section 13(a) of the Fair Labor Standards Amendments) and office, custodial, and maintenance workers, who after the date of the contract award, are engaged in any operation preparatory or necessary to or in the performance of a government contract are subject to the act.

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: Bath _____ :

ALL INFORMATION FURNISHED WILL BE HELD ABSOLUTELY CONFIDENTIAL

TO PERSON FILLING IN FORM: Fill in as completely as possible.
If any answer is not known, so state.

1. INFORMATION ABOUT ESTABLISHMENT

- (a) Name of establishment _____
- (b) Address _____
(number and street) (City) (Zone) (State)
- (c) Does the firm have branches? _____ Where? _____
- (d) Nature of business _____
(Example: manufacturing stoves, construction, wholesale shoes, mining, trucking oil, etc.)
- (e) Does establishment ship out of state? _____ Does establishment receive goods from out of state? _____
- (f) Does the establishment sell to or perform services for the following types of business? (Check):
- | | |
|---------------------------------|--------------------------------|
| _____ Private consumers | _____ Transportation companies |
| _____ Hotels, Restaurants, etc. | _____ Other public utilities |
| _____ Retail dealers | _____ Mining companies |
| _____ Wholesale dealers | _____ Manufacturers |
- (g) Has establishment worked on a U.S. GOVERNMENT contract recently? _____ What articles? _____

2. INFORMATION REGARDING WORKING CONDITIONS

- (a) Person furnishing information is _____
(Example: present employee, former employee, competitor, union, etc.)
- (b) In what respect do you think that the establishment has failed to comply with the Federal Wage and Hour Law or the Walsh-Healey Public Contracts Act:
- Minimum Wage ☐, Overtime ☐, Oppressive Child Labor ☐, Record keeping ☐, Illegal Home Work ☐, Other ☐.
- Describe: (If additional space is needed, please use reverse side)

(c) What is basis of pay of employee involved? \$ _____ per _____
(Example: hour, day, week, month, piece, etc.)

(d) Describe occupation _____

Name in full (print): _____

Signature _____ Telephone no. _____

Address (print): _____ Date of birth _____
(If under 21 years old)

DO NOT FILL IN BELOW THIS LINE - FOR OFFICE USE ONLY

Received at _____ Date _____

Taken by _____ Title _____

Forwarded to _____

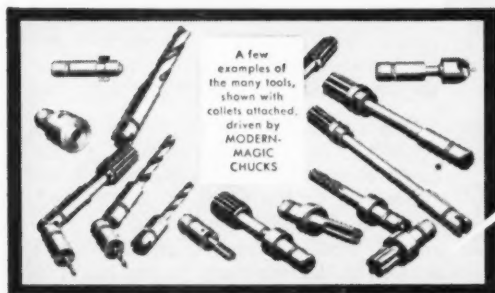
Material given person _____

(08274)

Speed up your production

**Change tools without
stopping . . . or even
slowing the machine**

MODERN-MAGIC QUICK CHANGE CHUCK and COLLET EQUIPMENT



CHUCK

RING

COLLET

**A finger touch raises
the ring and releases
the tool . . . instantly**

Modern Precision Tools Include

STATIONARY SELF-OPENING
DIE HEADS
ROTARY SELF-OPENING
DIE HEADS
STATIONARY
COLLAPSIBLE TAPS
ROTARY
COLLAPSIBLE TAPS
MODERN-MAGIC
CHUCKS AND COLLETS
SELF-OPENING
STUD SETTERS
INSERTED BLADE
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SOLID ADJUSTABLE
DIE HEADS
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MILLING TOOLS
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Modern-Magic Quick Change Chuck and Collet Equipment virtually eliminates costly lost time of revolving spindle machines. Used with such machines, tools are changed without stopping or even slowing the spindle. Changes are made from drill to reamer to tap instantaneously and safely while the machine is running at cutting speed. In this way, the Modern-Magic Chuck and Collet Equipment gives multiple spindle range to single spindle machines, increasing production and cutting cost. In high production shops, it has been proved they save time even though used only for changing from dull to sharp tools.

For full information, send for Bulletin M-103.
In addition to standard Modern-Magic Chucks
and Collets, it shows special types of each.

Only the ORIGINAL Modern-Magic Chuck and Collet Equipment carry the name
"MODERN-MAGIC" and are manufactured by Modern Tool Works, Rochester, N.Y.

MODERN TOOL WORKS

DIVISION

CONSOLIDATED MACHINE TOOL CORPORATION

SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED

ROCHESTER, NEW YORK

or connected with the performance of a government contract: workers closely associated with the productive processes involved in the manufacture of goods or commodities required by the government; laboratory technicians engaged in testing materials used in the productive processes necessary to the manufacture of the materials, supplies, articles, or equipment to be supplied the government; draftsmen engaged in the preparation of drawings, and operators of blueprint machines engaged in making blueprints, required to be supplied to the government; workers whose work subsequent to the date of award consists of building models and running tests of materials to be supplied the government; employees who make special dies and tools necessary for the performance of the contract; tool designers who actually design on paper the tools and instruments to be used in the performance of the contract; elevator men who operate elevators upon which materials used in the contract are moved from one floor to another; employees who clean machines or who remove waste and other accumulations resulting from the operation of the machinery or other equipment used in the contract; employees who prepare in-

structions for assembly, erection, maintenance, or repair to accompany a commodity required under the contract; shipping employees; employees examining or inspecting materials, supplies, articles, or equipment to be supplied the government; time-study men who set the standard times and piece-work operations performed on the contract; foremen supervising the performance of work on the contract, and instructors of employees performing such work; tool crib employees engaged in supplying necessary tools to employees working on the contract; dispatchers and trouble-shooters whose duties are to expedite parts and materials to the places and at the times needed for continuance of production operations on the government contract.

The regulations provide that if no separate records for employees engaged on government work are maintained, all employees in the plant or department where the work is performed are presumed, until affirmative proof is presented to the contrary, to be engaged on government work.

Unlike the Fair Labor Standards Act, 1949 amended, the Walsh-Healey Public Contracts Act requires that all employees engaged on a government contract, must not be paid less than the minimum wages as determined by the Secretary of Labor as required in Section 41 thereof.

On the other hand, this law differs again because Section 42 of the act provides that overtime pay must be made after **eight hours in any one day** or in excess of forty hours in any one week, whichever yields the greater amount of compensation. For example, whenever an employee in a metalworking establishment works on a government contract for any part of a day in a given payroll or workweek (after the employer has commenced and before the employer has completed work on the



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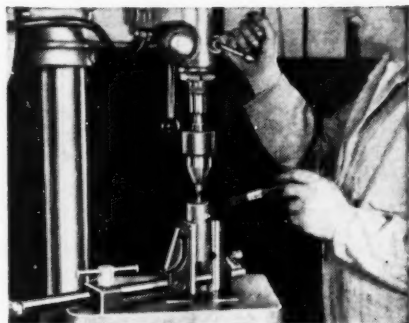
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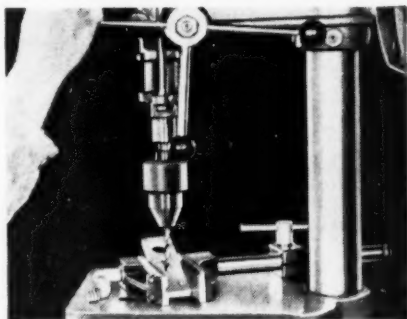
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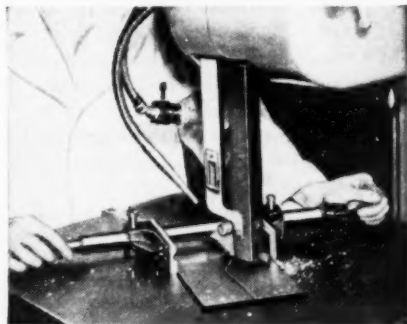
Order from **your industrial supply distributor** or write for illustrated folder to: Wahlstrom/Float-Lock Sales Dept., American Machine & Foundry Company, 511 Fifth Avenue, New York 17, N. Y.



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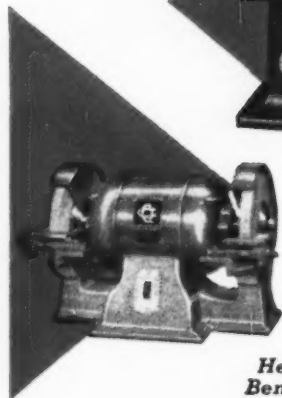
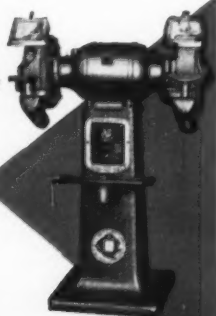
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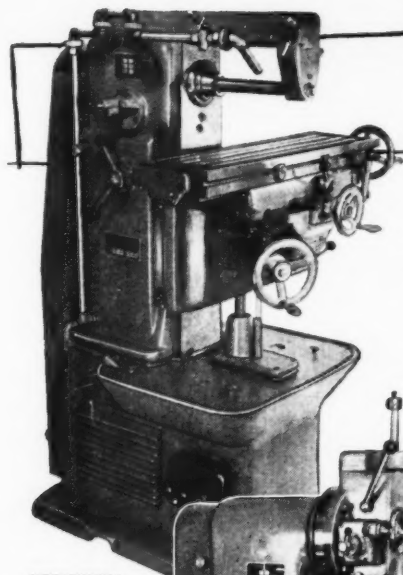
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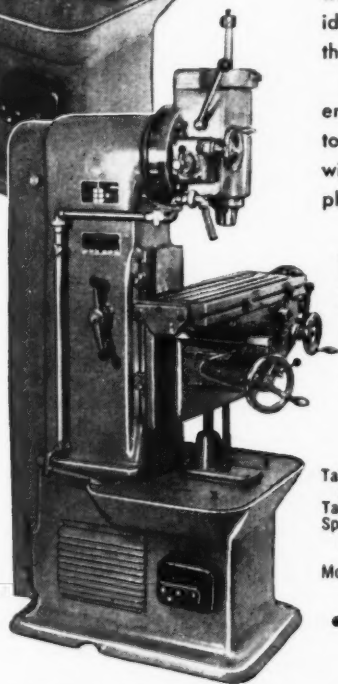
contract), he is entitled to be paid one and one-half times his basic rate of pay for all hours in excess of 8 on that day or in excess of 40 in the workweek, whichever yields the employee the greater compensation. Suppose an employee works 10 hours a day 6 days per week, starting with Monday, and works Monday morning on a government contract, his overtime compensation on a daily basis would be computed as 2 hours, overtime compensation for each succeeding day, or 12 hours of overtime compensation; but inasmuch as he worked 60 hours in the week, his overtime compensation on a weekly basis would amount to 20 hours at overtime rates for the hours in excess of 40.

In addition, where an employee is employed at an hourly rate, without other forms of compensation, the "basic rate" of pay upon which his overtime compensation is computed is the specified hourly rate. For example, if the employee is compensated on a weekly salary basis, his basic or regular hourly rate of pay, on which time and a half must be paid, will be figured by dividing the salary by the regular number of hours worked to earn that salary; or, if no regular number of hours is worked, by the total number of hours worked each week. Of course, if the employee works a regular number of hours for the salary, the hourly rate of pay will be a fixed rate, remaining unchanged from week to week. But on the other hand, if the employee works a fluctuating and not a regular number of hours, the hourly rate of pay will be the average hourly rate for the week and will vary from week to week.

In the case of an employee on a monthly salary basis, the monthly salary is subject to translation into its equivalent weekly wage by multiplying by 12 (number of months) and dividing by 52 (number of weeks). Likewise for a semi-monthly salary, that



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Motor	1 or 1½ HP	1 HP

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is, multiplying by 26 and dividing by 52.

Further, where an employee in a machine-tool shop is compensated entirely by piece rates, even though he may work at only one piece-rate in the week, the employer will be viewed as complying with the overtime pay requirements if he pays the employer at the piece rate for the straight-time hours and increases the piece-rate by 50-percent for all work performed in the overtime hours in a week. And where daily earnings of an employee fluctuates from day to day by reason of the payment of piece-rates or of performance premiums under an incentive plan, his basic hourly rate is arrived at by dividing his total earnings for a given workweek by the total number of hours worked in that week.

Inadequate and inaccurate record-keeping of a metalworking enterprise can prove costly. However, the records which a contractor must keep while engaged on a government contract should present no undue burden. No special form or orders are required, but complete record-keeping data must be available for inspection. Hence, the following record-keeping items under the Walsh-Healey Public Contracts Act should be preserved and maintained for obvious reasons:

1. Name in full
2. Home address
3. Sex
4. Occupation in which employed
5. Date of birth if under 19
6. When each workday and each workweek begins
7. Hours worked each workday and each workweek
8. Basis on which wages are paid
9. Basic hourly rate of pay
10. Total straight-time and overtime compensation earned
11. Date of payment and period covered by payment
12. All additions to and deductions from wages paid

13. Total wages paid each pay period

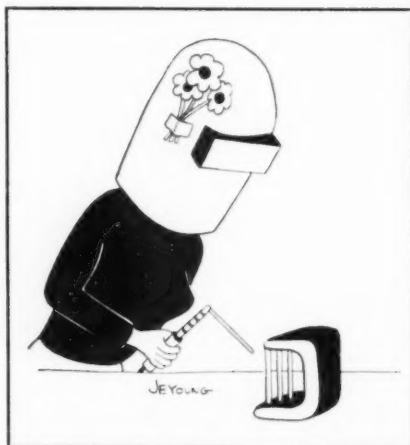
14. Records of Injury Frequency Rates

15. Contracts Numbers

The Walsh-Healey Act provides that no metalworking plant may be permitted the employment of child-labor, that is, no male under 16 and female under 18 is allowed to work on a government contract. Further, it requires that the contract must be performed in sanitary surroundings and not within conditions hazardous or dangerous to the health and safety of employees.

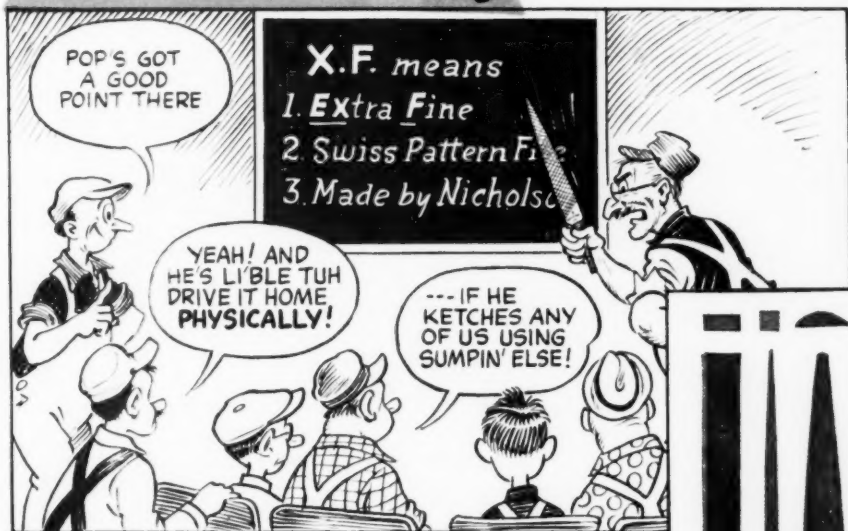
Machine-tools, equipment, and materials enterprises who are government contractors will be subject to violation of any of the stipulations if compliance is not obtained. For example, the right of the government for liquidated damages, charging any additional costs to the contractor; the sum of \$10.00 per day for each minor so employed on a government contract; for underpayments of straight-time and overtime after 8 hours daily or 40 hours weekly, which yields the greater amount of compensation; placement on the list of ineligible for future contracts.

The End





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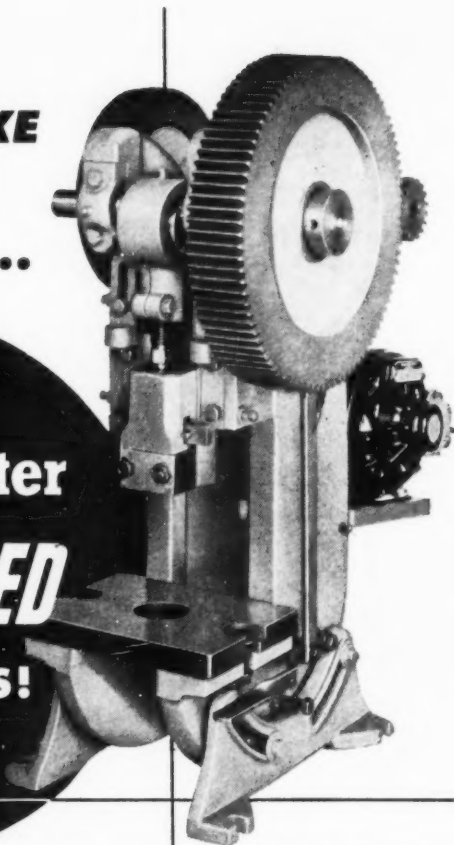


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BLUE BOOK'S Know How Reference Sheets

MATERIAL	SPEED IN FEET PER MIN.	DRILL DIAMETER								
		$\frac{1}{16}$ TO $\frac{1}{8}$	$\frac{9}{32}$ TO $\frac{1}{4}$	$\frac{5}{16}$ TO $\frac{3}{8}$	$\frac{1}{2}$ TO $\frac{1}{2}$	$\frac{1}{2}$ TO $\frac{3}{4}$	$\frac{3}{4}$ TO 1	$1\frac{1}{4}$ TO $1\frac{1}{4}$	$1\frac{1}{2}$ TO $1\frac{1}{2}$	$1\frac{1}{2}$ AND LARGER
		FEED PER REVOLUTION INCHES								
Aluminum	250 TO 300	.002 TO .003	.003 TO .005	.005 TO .006	.006 TO .008	.008 TO .010	.010 TO .013	.013 TO .020	.015 TO .016	.016 TO .018
Brass or Bronze	150 TO 200	.002 TO .004	.004 TO .007	.007 TO .010	.010 TO .014	.014 TO .018	.016 TO .022	.020 TO .026	.026 TO .030	.030 TO .040
Forgings: Alloy Steel	60 TO 75	.002 TO .003	.003 TO .004	.004 TO .006	.006 TO .009	.008 TO .012	.010 TO .014	.012 TO .016	.014 TO .020	.016 TO .026
Forgings: Alloy Steel Heat Treated	45 TO 60	.002 TO .003	.003 TO .004	.004 TO .005	.005 TO .006	.007 TO .010	.009 TO .012	.010 TO .014	.012 TO .016	.014 TO .022
Iron: Cast Malleable	75 TO 110	.002 TO .004	.004 TO .006	.006 TO .009	.009 TO .012	.012 TO .016	.014 TO .020	.018 TO .025	.022 TO .028	.022 TO .030
Monel Metal	60 TO 75	.002 TO .003	.003 TO .004	.004 TO .006	.006 TO .009	.008 TO .012	.010 TO .014	.012 TO .016	.014 TO .020	.016 TO .026
Steel: Carbon .2 to .3	70 TO 95	.002 TO .003	.003 TO .005	.005 TO .007	.006 TO .010	.010 TO .014	.014 TO .016	.016 TO .022	.018 TO .025	.020 TO .028
Steel: Cast Nickel, 3 1/2%	60 TO 75	.002 TO .003	.003 TO .005	.004 TO .006	.006 TO .010	.010 TO .014	.014 TO .016	.016 TO .022	.018 TO .025	.020 TO .028
Steel: Molybdenum Stainless Tool	60 TO 75	.002 TO .003	.003 TO .004	.004 TO .006	.006 TO .009	.008 TO .012	.010 TO .014	.012 TO .016	.014 TO .020	.016 TO .026

CARBIDE DRILLING SPEEDS IN SURFACE FEET PER MIN.

MATERIAL	Drill Diam.	Speed	MATERIAL	Drill Diam.	Speed
Non-ferrous Alloys.....	.....	150	Glass.....	.....	20
Cast Iron (Soft).....	$\frac{1}{8}$ to $\frac{3}{8}$	70	Steel (Over 375 Brinell).....	.....	100
Cast Iron (Soft).....	$\frac{1}{4}$ to 1	85	Plastic (Phenolic, etc.).....	.....	100
Cast Iron (Soft).....	1 or more	125	Plastic (Glass Bonded).....	.....	50
Cast Iron (Chilled).....	.....	30	Wood.....	.....	200

Courtesy: Threadwell Tap & Die Co.

Suggested Surface Speeds for Various Work Materials (in Feet per Minute)

BLUE BOOK'S Know How Reference Sheets

WORK MATERIAL	TOOL MATERIAL		
	H.S.S.	Cast Alloy	Carbide
Aluminum	600-1000	...	1000-15000
Brass	200-600	300-600	600-2000
Bronze	150-250	250-350	350-450
Cast Iron, Soft	90-110	125-250	250-300
Cast Iron, Medium	65-85	95-200	225-275
Cast Iron, Hard	40-60	75-150	175-225
Copper	200-600	...	600-2000
Die Casting, Zinc Alloy	200-600	...	600-2000
Malleable Iron	80-120	150-225	300-400
Plastics and Non-metallic Materials	65-400	150-500	600-1500
Steel, Alloy, Soft	80-110	150-200	400-500
Steel, Alloy, Medium	60-80	100-150	375-425
Steel, Alloy, Hard	40-60	...	225-375
Steel, Free Machining	90-200	150-225	400-900
Steel, Cast	60-80	90-125	200-250
Steel, Stainless	40-60	60-125	200-500
Steel, Tool	50-80	60-125	200-500

The above suggested ranges are generally too high for sand cast material because of residual sand forming a highly abrasive surface. On sand castings, the operating surface speed must usually be held to the low side of the range or even further reduced. This is particularly necessary if the cutting edge of the tool makes initial contact with the surface of the work material.

Courtesy: Gorham Tool Co.



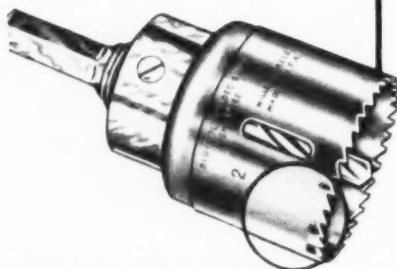
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**Suggested Table Feeds (in inches per tooth) for
Various Work Materials when Machined with
Multiple Point Tools**

BLUE BOOK'S Know How Reference Sheets

WORK MATERIAL	TOOL MATERIAL		
	H.S.S.	Cast Alloy	Carbide
Aluminum . . . . .	.005-.015	...	.009-.020
Brass . . . . .	.005-.010	.005-.010	.008-.015
Bronze . . . . .	.003-.008	.005-.010	.008-.015
Cast Iron, Soft . . . . .	.004-.010	.005-.015	.005-.025
Cast Iron, Medium . . . . .	.003-.008	.004-.015	.005-.020
Cast Iron, Hard . . . . .	.002-.006	.002-.015	.005-.015
Copper . . . . .	.002-.006	...	.008-.015
Die Casting, Zinc Alloy . . . . .	.004-.010	...	.006-.015
Malleable Iron . . . . .	.003-.008	.004-.015	.006-.020
Plastics and Non-metallic Materials . . . . .	.005-.010	.005-.010	.012-.015
Steel, Alloy, Soft . . . . .	.003-.008	.003-.008	.006-.020
Steel, Alloy, Medium . . . . .	.002-.006	.002-.008	.006-.020
Steel, Alloy, Hard . . . . .	.001-.004	...	.005-.015
Steel, Free Machining . . . . .	.003-.008	.003-.008	.006-.020
Steel Cast . . . . .	.001-.005	.002-.006	.005-.015
Steel, Stainless . . . . .	.002-.005	.002-.005	.003-.012
Steel, Tool . . . . .	.001-.005	.001-.005	.003-.012

The above suggested ranges are necessarily broad to cover a wide range of design of tools, operating conditions and required performance. The best feed is the heaviest feed that satisfies all other limiting factors. This is particularly true when machining work hardening materials where a light feed would generate heat with consequent work hardening and premature tool failure.

Courtesy: Gorham Tool Co.

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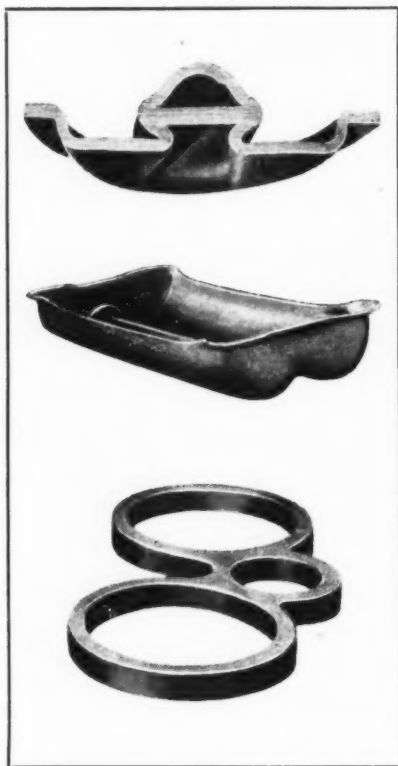
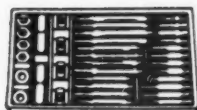


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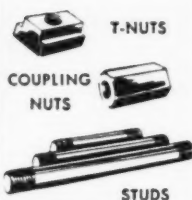
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A DIVISION OF LUKENS STEEL COMPANY

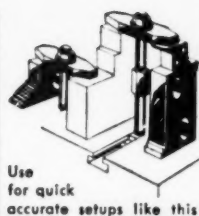
LUKENS



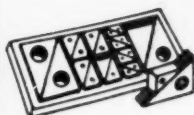
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16 sizes carried in stock



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COUPLING NUTS
STUDS



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for quick
accurate setups like this

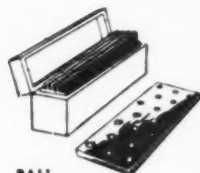


SURE GRIP STEP BLOCKS

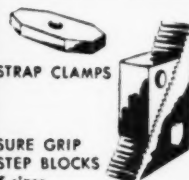
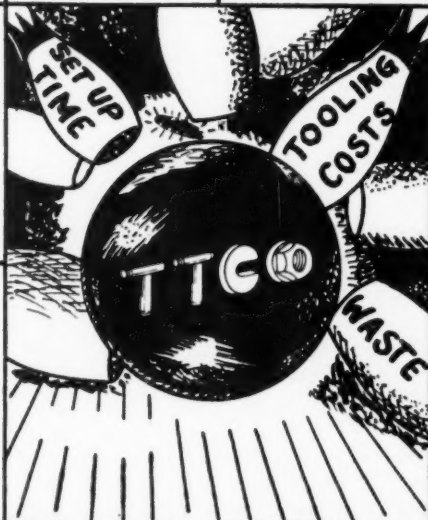
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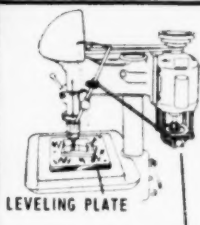


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How to Select the Proper Steel for Long, Productive Die Life

By **Stewart G. Fletcher**
Chief Metallurgist
Lotrobe Steel Company
Lotrobe, Pa.

BECAUSE of the large number of die steels on the market, the general lack of classification, and the fact that each tool steel manufacturer and steel jobber has his own steels called by name, die steels have become a complex problem.

Die steels are of many types for the performance of many different functions. In some applications, such as blanking or forming dies, pictured in figures 1 and 2, they must be extremely hard and wear resistant, and maintain perfect working surfaces over long periods of time. Other applications, like draw dies, require the die steel to be relatively hard, yet tough, and resistant to frequent shock loading. More often than not, the required properties are not compatible, one with the other, and some compromise choice must be made or the die redesigned to take best advantage of the properties of the steel; thus, this diversity of required properties has naturally led to the development and marketing of many types

of die steels, with hundreds of different die steels within each type.

Many of these steels are duplications, at least so far as chemical composition is concerned. They all fall into distinct classifications, and their basic properties within a given classification are the same; however, this similarity often ends at chemical composition. While it is true that the basic properties and characteristics of a steel are established by its chemical composition, much more than mere chemistry enters into the metallurgical characteristics of the material, and it is these characteristics which determine the final suitability of the die material to the work at hand.

Nearly all classification systems published for die steels are based on chemical composition. Over the past decade or two, certain analyses have gradually become recognized as standard for the different types of die steel required by industry; but a good, uniform way of coding these grades has not been

worked out and accepted by the die steel makers and users together.

This lack of system has been at least partially remedied, for in cooperation with the American Iron and Steel Institute, representing the steel makers, and the Society of Automotive Engineers, representing a large segment of die steel users, a simple system of classification has been introduced recently. It also is based on chemical composition, although the various standard analyses are grouped and coded in relation to their most common usages. This classification initially was published in the 1952 Edition of the SAE Handbook and is reproduced in table I.

The steels most commonly employed in metal-stamping dies are listed in table II.

This article will be confined to the materials listed in table II, since they represent the vast majority of tool steel being used in metal-stamping dies today. Carbide dies, rubber forming dies, or other special applications will not be covered.

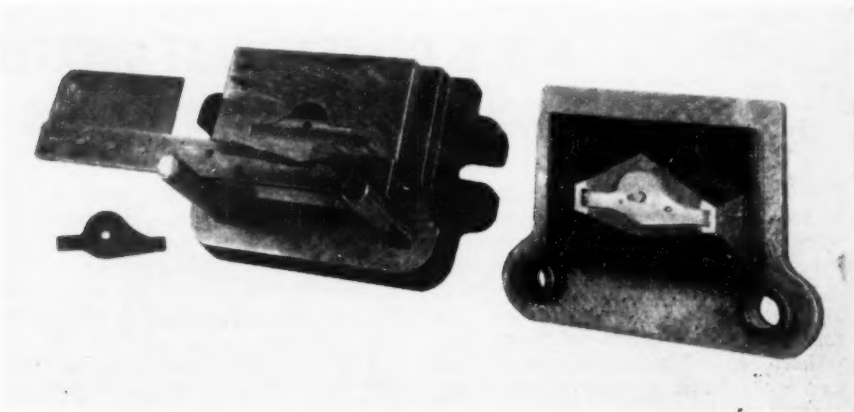
The compositions range from prac-

tically no alloying addition (plain carbon grade) to upwards of 15% alloy in some of the high carbon-high chromium grades. The alloying elements used are potent too. Manganese, chromium and molybdenum exert tremendous effects on the hardenability (or ease of producing high hardness); tungsten is primarily a heat-effect retardant; vanadium (in conjunction with additional carbon) markedly increases wear resistance.

The problem of selecting the proper die steel for the job at hand depends on a number of interrelated factors: (1) Length of run required; (2) cost of steel; (3) ease of machining; (4) distortion in heat treating; (5) abrasion resistance required; (6) heat treating equipment available; (7) grinding difficulties; (8) hardness required; (9) availability of steel; (10) ease of reworking; (11) edge strength, and (12) resistance to shock. In discussing each of the basic grades of tool steels used for metal forming and stamping dies, the properties influencing the selection of the proper die steel composition

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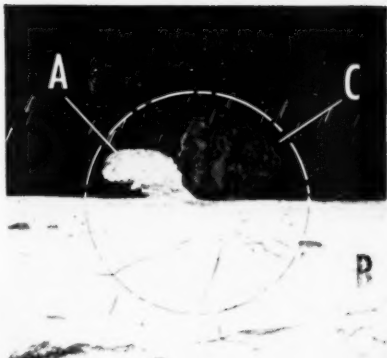
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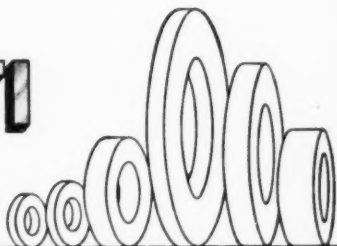


TABLE 1
SAE CLASSIFICATION AND IDENTIFICATION OF TOOL STEELS
Approximate Chemical Composition

SAE Steel Designation	C	Mn	Si	Cr	V	W	Mo	Co	Ni
WATER-HARDENING TOOL STEELS									
W1	0.70-0.85	—	—	—	—	—	—	—	—
W1	0.85-0.95	—	—	—	—	—	—	—	—
W1	0.95-1.10	—	—	—	—	—	—	—	—
W1	1.10-1.30	—	—	—	—	—	—	—	—
W2	0.85-0.95	—	—	0.15-0.35	—	—	—	—	—
W2	0.95-1.10	—	—	0.15-0.35	—	—	—	—	—
W3	0.95-1.10	—	—	0.35-0.50	—	—	—	—	—
SHOCK-RESISTING TOOL STEELS									
S1	0.50	0.25	0.35b	1.40	0.20	2.25	0.40c	—	—
S2	0.50	0.40	1.00	—	0.25c	—	0.50	—	—
S3	0.55	0.60	2.00	0.30c	0.25c	—	0.40c	—	—
COLD WORK TOOL STEELS									
Oil-Hardening Types									
O1	0.90	1.20	0.25	0.50	0.20c	0.30	—	—	—
O2	0.90	1.60	0.25	0.35	0.20c	—	0.30c	—	—
O6	1.45	0.75	1.00	—	—	—	0.25	—	—
Medium-Alloy Air-Hardening Types									
A2	1.00	0.60	0.25	5.25	0.40c	—	1.10	—	—
High-Carbon High-Chromium Types									
D2	1.50	0.40	0.40	12.00	0.80c	—	0.90	0.60c	—
D3	2.15	0.35b	0.35	12.00	0.80c	0.75c	0.80c	—	0.30c
D5	1.50	0.40	0.40	12.00	0.80c	—	0.90	3.10	—
HOT-WORK TOOL STEELS									
Chromium-Base Types									
H1	0.35	0.30	1.00	5.00	0.40	—	1.50	—	—
H2	0.35	0.30	1.00	5.00	0.25c	1.25	1.50	—	—
H3	0.35	0.30	1.00	5.00	0.30	—	1.50	—	—
Tungsten-Base Types									
H21	0.32	0.30	0.20	3.25	0.40	9.00	—	—	—
HIGH SPEED TOOL STEELS									
Tungsten-Base Types									
T1	0.70	0.40	0.30	4.10	1.10	18.00	—	—	—
T2	0.80	0.30	0.30	4.10	2.00	18.00	0.80	—	—
T3	1.05	0.30	0.30	4.10	3.25	18.50	0.70	—	—
T4	0.75	0.30	0.30	4.10	1.00	18.00	5.00	—	—
T5	0.80	0.30	0.30	4.10	1.75	18.50	8.00	—	—
T6	0.80	0.30	0.30	4.10	1.75	20.00	12.00	—	—
T8	0.80	0.30	0.30	4.10	2.00	14.00	0.80	5.00	—

Molybdenum-Base Types

M1	0.80	0.30	0.30	4.00	1.15	1.50	8.50	—
M2	0.83	0.30	0.30	4.10	3.25	5.75	5.25	—
M3	1.30	0.30	0.30	4.25	4.25	6.00	5.00	—
M36	0.85	0.30	0.30	4.10	2.00	6.00	5.00	8.00
SPECIAL PURPOSE TOOL STEELS								
Low-Alloy Types								
L6	0.75	0.70b	0.25	0.85b	0.25b	—	0.50c	1.50b
L7	1.00	0.35	0.25	1.40	—	—	0.40	—

a—Water-hardening steels listed herein are usually available in four grades or qualities as follows:
 Special (Grade 1)—The highest quality water-hardening carbon tool steel, controlled for hardenability, chemistry held to closest limits, and subject to most rigid tests to insure maximum uniformity in performance.
 Extra (Grade 2)—A high quality water-hardening carbon tool steel, controlled for hardenability, subject to tests to insure good service for general application.
 Standard (Grade 3)—A good quality water-hardening carbon tool steel, not controlled for hardenability, recommended for application where some latitude with respect to uniformity is permissible.
 Commercial (Grade 4)—A commercial quality water-hardening carbon tool steel, not controlled for hardenability, not subject to special tests.
 On special and extra grades, limits on manganese, silicon, and chromium are not generally required in lieu of the Shepherd hardenability limits on standard and commercial grades, the following limits on composition are generally required:

Standard	Mn	Si	Cr
Commercial	0.35 max	0.35 max	0.15 max
Total of manganese, silicon, and chromium not to exceed 0.75%.	0.35 max	0.35 max	0.20 max

b—May be present in percentages other than shown.
 c—Optional element. Steels have found satisfactory application either with or without the element present.

will be considered, in their relation to these quality factors.

Water Hardening, Low Alloy Die Steels

These materials as a whole are used in operations requiring relatively short runs, for their abrasion resistance is somewhat lower than the others. They are shallow hardening, which in many instances is a determining factor in their selection.

For example, cold header dies are most frequently made of straight carbon tool steel. It is well adapted to the shock loading characteristic of cold heading operations, silverware striking dies, and coining dies, for when heat treated, a relatively thin but hard and strong working surface is developed on a medium-hard, tough, resilient backing.

The straight carbon steels may also be used for trimming dies, or forming dies where only a short life is necessary, and the cost of the die steel represents a major factor in the cost of the parts produced. But the carbon steels are rather difficult to heat treat without distortion, and this factor alone rules them out for many types of dies. They have only moderate resistance to abrasion, and will soon lose their cutting edge through wear. Because of the composite hardening characteristics, few regrindings can be employed before the hard, wear resistant surface layer is removed. They also are not resistant to heat, and if they should become even moderately heated in operation, the desired hardness and cutting characteristics soon vanish.

One modification of the carbon steels which deserves special mention is that containing about 3.5% tungsten. This grade, which is made in both water and oil hardening modifications, possesses very good abrasion resistance because of the multitude of fine iron-tungsten complex carbide particles produced. The surfaces of properly heat

TABLE II
Classes and Grades of Steels for Metal-Stamping Dies

Grade	SAE Designation	Carbon	Manga- nese	Sili- con	Chemical Composition Chro- mium	Vana- dium	Tung- sten	Molyb- denum	Cobalt
1	W1 or W 2	1.00			Water-hardening, Low Alloy	(.15)			
2	—	1.00			.50	(.15)			
3	—	1.25					3.50		
1	O1	.90	1.00		Oil-hardening, Low Alloy		.50		
2	O2	.90	1.60		.50				
1	A2	1.00			Air-hardening, Medium Alloy			1.00	
					5.00				
1	D2	1.50			Air-hardening, High Alloy	(1.00)		1.00	
2*	D3	2.25			12.00			(1.00)	
3	D5	1.50			12.00			(1.00)	3.00
4	—	2.50			12.00	4.00		1.00	

*Oil-hardening without molybdenum.
(Analyses in parentheses are optional.)

TABLE III
Resistance to Abrasion of Various Type Die Steels

Type of Steel	Steel No. 1	Rockwell C	Percentage of Material Abraded*
Water Hardening	Steel No. 1	65.5	121
Oil Hardening	Steel No. 1	63.5	106
Air Hardening, Low Alloy	Steel No. 1	60.0	100
Air Hardening, High Alloy	Steel No. 2	62.0	58
Air Hardening, High Alloy	Steel No. 4	64.0	7

*Based on Air Hardening, Low Alloy Steel No. 1 as 100%.
Results from laboratory tests of metal wear vs. dry abrasive.

TABLE IV
Comparison of Toughness Characteristics for Various Types of Die Steels

Type of Steel	Steel No. 1	Rockwell C Hardness	ft. lbs. Impact Strength Unnotched Izod Over 240*
Water Hardening	Steel No. 1	63 (surface)	
Oil Hardening	Steel No. 2	60	50
Air Hardening, Low Alloy	Steel No. 1	62	62
Air Hardening, High Alloy	Steel No. 1	61	54
Air Hardening, High Alloy	Steel No. 2	62	24
Air Hardening, High Alloy	Steel No. 4	64	18

*Shallow hardening, with core at Rockwell C42. Other grades hardened throughout.

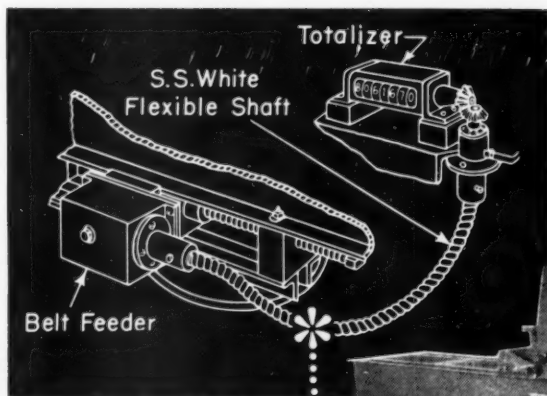
treated dies often exceed Rockwell C 67 in hardness, and as a result the coefficient of friction is extremely low.

This modification, however, is quite brittle, particularly at the high hardness levels which bring out its best properties, so it must be used with great care, and only in dies which are provided with good alignment and adequate backing. It also becomes soft when exposed, even only briefly, to high temperatures in operation (over 300° F), and thus will lose its keen cutting edge. Distortion again is relatively severe in heat treatment; be-

cause of this, complex precision dies cannot easily be made from this grade of steel.

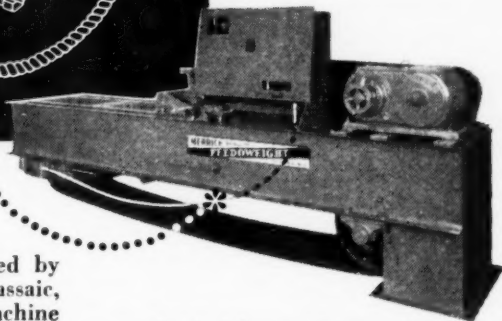
The carbon steels can be hardened from relatively low austenitizing temperatures, 1420-1600° F, and are almost invariably water quenched. The high rate of cooling required to produce full hardness also tends to promote excessive distortion in dies of any but the simplest shapes. Irregularly shaped dies, particularly those with thin sections adjacent to heavy sections, are also liable to cracking; the heat treater sometimes must use all sorts of tricks

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2. High carbon-high chromium forming die for producing automatic clutch yokes.

to prevent this cracking or severe distortion. Tempering must follow immediately after quenching, or again the material is liable to crack from the very high internal stresses set up by the water quench.

Summarizing the characteristics of carbon or water hardening steels for dies, it may be said they are best used for relatively short runs; the steel is inexpensive, readily machinable, easy to grind and obtains high hardness. However, it is subject to severe distortion or even cracking when hardened in irregular sections; the edge strength is not high, and it is not very resistant to shock unless hardened to a relatively shallow depth.

Oil Hardening, Low Alloy Die Steels

The very factors which most strongly militate against the use of water hardening steels for dies resulted in the development, early in the twentieth century, of the oil hardening steels. The two principal improvements over carbon steel demonstrated by the oil hardening die steels are those of (1) relative freedom from distortion and size change

in hardening, and (2) relatively deep hardenability.

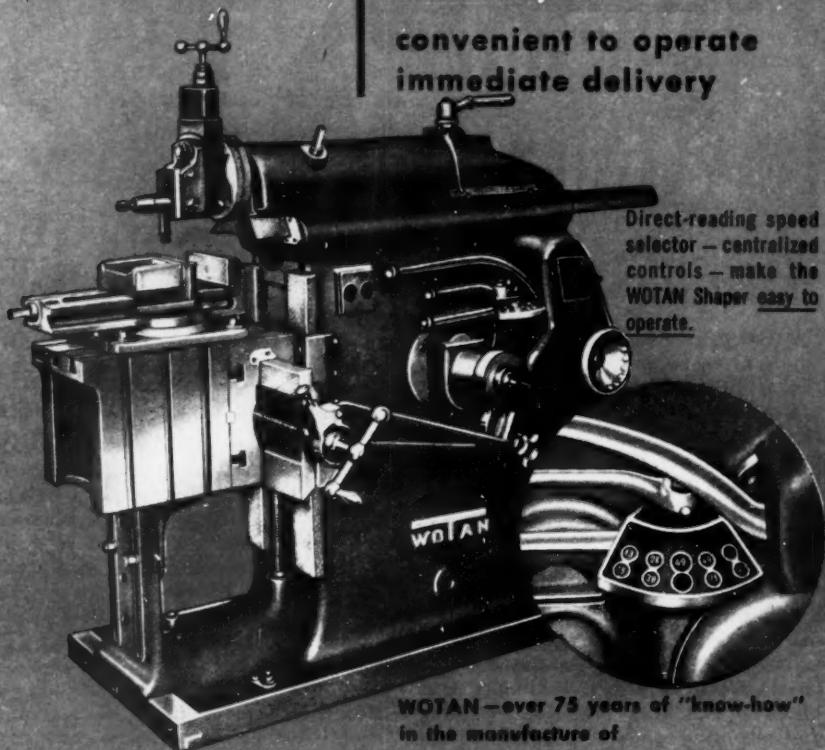
The former of these resulted in the use of the terms "non-deforming," "non-shrinking," etc., for these materials, and many of the trade names covering these grades reflect these characteristics. The addition of manganese, with or without the additional small amounts of chromium and tungsten, has, in fact, produced a steel which when properly heat treated comes out with very little or no size change and distortion, compared to the water hardening steels. Actually, the higher alloyed steels are today better in this respect than the oil hardening varieties, as will be shown later; but at the time of their introduction, the manganese oil hardening die steels could truly be classified as "non-deforming."

These materials usually provide better die life than the water hardening steels. The addition of alloying elements, particularly chromium and tungsten, increase the resistance to wear. More important, they are deep hardening, usually through the entire section, and this often results in better die performance. On the other hand,

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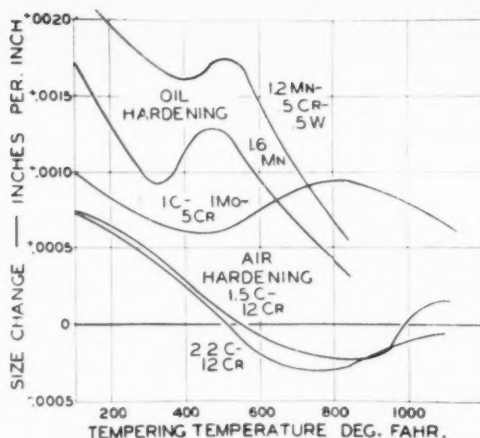


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3. Size change obtained in heat treating the common die steels. These data are based on normal hardening temperatures for each grade.



since these grades harden through their whole cross-section, they obviously do not have the resilient back-up core provided naturally in the water hardening steels. Consequently, they must be used much more carefully, the dies aligned better, and proper measures taken to insure freedom from excessive shock. The shock resistance is not nearly as high as that of the water hardening steel with an unhardened core.

For moderate production runs the manganese oil hardening steels are hard to beat, and are very popular die materials. General-purpose trimming dies, blanking dies and even some sectional dies are often made of this class of die steel. These steels are relatively low in cost, easy to machine, fairly easy to heat treat without undue size change except in the most precise work, and have moderately good resistance to wear and resistance to shock. In many of these characteristics the manganese oil hardening steels represent the best general compromise of properties, and large tonnage are used for general-purpose die work, usually not involving long production runs. This general demand results in good availability of the steel, for it is advantageous for sup-

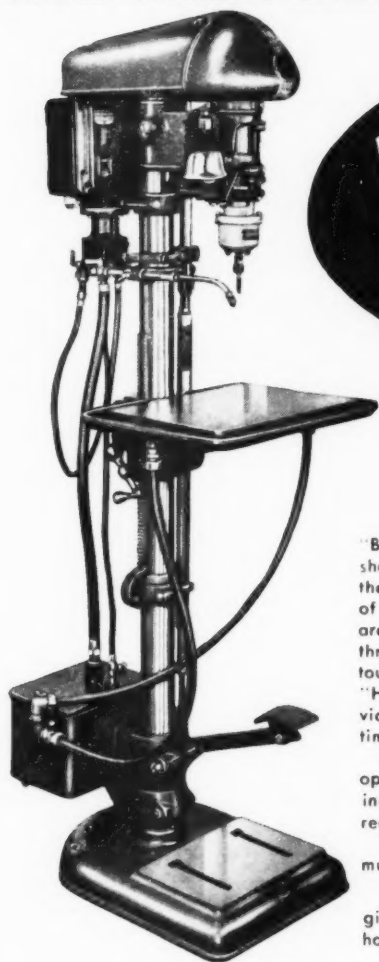
pliers to carry extensive stocks in these grades.

Air Hardening, Medium Alloy Die Steel

Further improved die life is provided by the air hardening-medium chromium-medium carbon steel (1.0% carbon, 5.0% chromium, 1.0% molybdenum). As the addition of manganese slowed heat treating reactions enough to make the steel oil hardening, the addition of 5% chromium and 1% molybdenum renders the material air hardening. For the precision die builder this is a tremendous step forward. Distortion and size change resulting in heat treating is still further reduced; and more complex, more precise dies can be made without running into excessive reworking or finishing after heat treatment.

The addition of chromium and molybdenum has a further salutary effect; it greatly improves the abrasion resistance of the dies. This improvement shows up well in table III, where it is seen that this type of steel has somewhat greater wear resistance than the oil hardening steels under the particular test conditions involved. The increased resistance to abrasive wear

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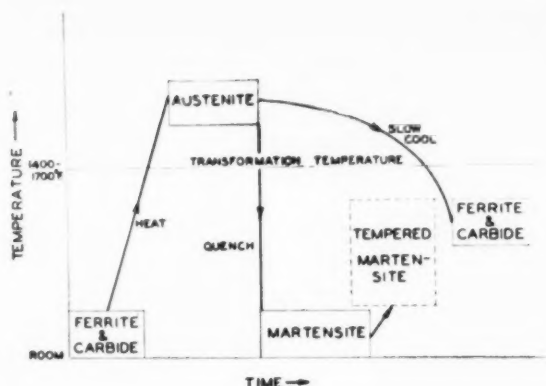
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4. Simplified chart for hardening of steel.



naturally reflects itself in greatly improved die life, more especially in applications in which the oil hardening steels cannot last for the duration of the die run.

With these obvious advantages, the air hardening medium alloy steel has a few drawbacks compared to the oil hardening steels. It is not too easily machinable; thus dies made from this grade are somewhat more expensive. Its heat treatment may be considered to be slightly more difficult, because higher temperatures are necessary (1750° F vs. 1500° F), and it is very sensitive to the control of hardening temperature. This means that considerably better furnace and pyrometer equipment is required. In addition, the higher temperature demands a greater emphasis on control of the surface during heat treatment, for decarburization and scaling can easily take place if not very carefully watched.

These factors can be countered in most cases by improved die life, if long die life is required. The choice frequently is one of economics, but the general trend is away from the oil hardening to the air hardening steels for added performance. This grade is also gradually and steadily taking hold as a standard general-utility die steel,

supplanting the manganese oil hardening grade, particularly in shops doing their own heat treatment which have the furnace facilities available for proper handling of this type of steel.

Air Hardening, High Alloy Die Steels

These are the aristocrats of the die steels. They are hard, unbending, and expensive, as true aristocrats should be. When put to the test, however, they show their true colors and come out on top every time a really hard job is encountered.

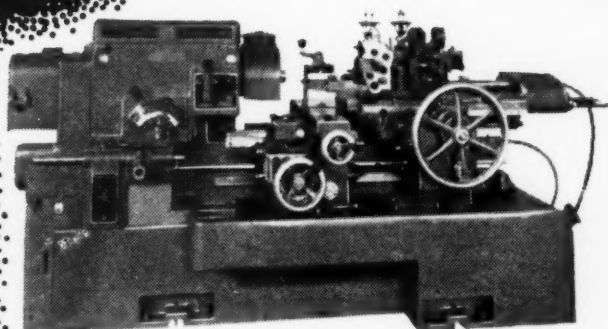
These are the high carbon-high chromium steels. Except for the 2.25% carbon variety, they are air hardening even in heavy sections. This one grade is oil hardening, but for classification purposes it is included with the other high carbon-high chromium grades because of its similarities of application.

The air hardening high alloy die steels are noted for their excellent resistance to abrasive wear; this is their most important characteristic in selecting them for any given die application. As shown in table III, it is evident that any of these materials will greatly outlast the medium alloy air hardening, the manganese oil hardening, or the carbon steels. Thus, one of these grades

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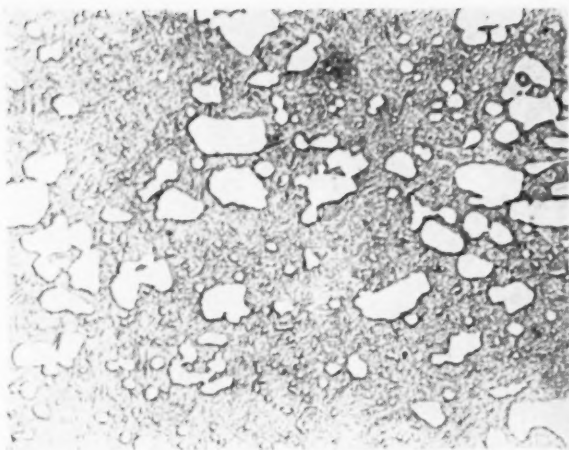


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5. Microstructure of hardened high-carbon high chromium die steel. The white-appearing islands and the small spheroids are complex iron-chromium carbide (1000X—unetched).



must be the choice for the longest run dies, for as a class they will outwear any of the other types of die steels.

These long wearing tendencies cannot be had without the sacrifice of some other properties, though these properties are usually considered less important. For example, these steels in some cases are not shock resistant (see table IV) as the other grades. This means the dies must be very carefully built and mated; the presses must be in good order; the die sets must be of best quality obtainable. Otherwise, misalignment results, and even minor misalignment can lead to early failure by chipping or cracking. Often the dies must be inserted or backed up by a tougher, less hard steel for resiliency and shock absorbency. This practice is becoming very common, and when used to proper advantage can greatly extend die life before failure by cracking.

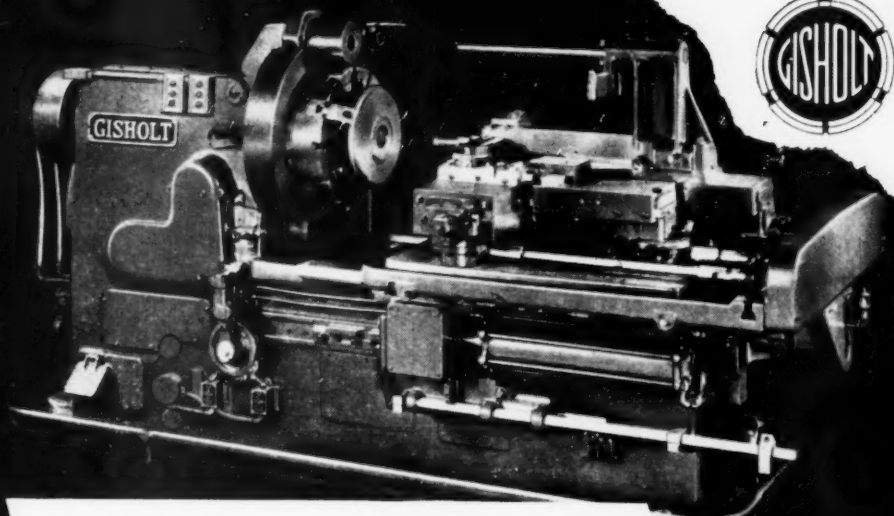
They are also difficult to machine, though here usually the ends justify the means, for the added costs of die building can be distributed over a much longer run of finished parts, most frequently to great economic advantage.

Grinding also presents a problem,

particularly in the 4% vanadium grade, and here again it becomes a question of whether added grinding and finishing cost pay for themselves in longer production runs.

These high alloy air hardening die steels exhibit another characteristic which, when properly used to best advantage, can result in very great benefits. They have the least distortion and size change in heat treating of all the various die steels. This is brought out clearly in figure 3. Frequently this means that dies can be completely finished to size prior to heat treating, while they are still soft and relatively workable. After hardening, little if any clean-up or grinding is necessary, providing the heat treatment is properly carried out and the surface adequately protected from decarburization, carburization or scale formation.

Considering all factors, the high carbon-high chromium die steels are the best available for long-run blanking and forming operations. They rank below only carbide dies in the amount of production obtainable. Their high resistance to abrasion, combined with excellent edge strength and low galling tendencies add up to the best possible

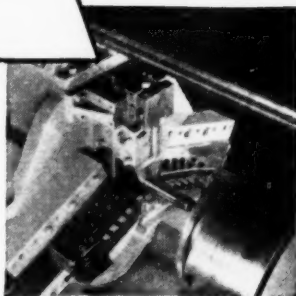


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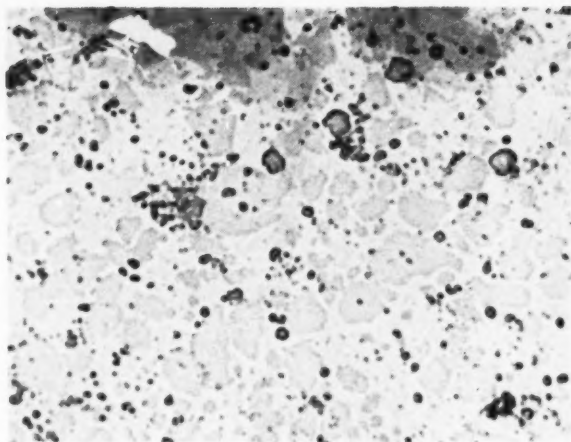
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6. Microstructure of hardened high-carbon high-chromium die steel containing 4% vanadium. The dark particles are excess vanadium carbide. The gray particles are excess iron-chromium complex carbide (1000X—unetched).



die steel. It is not inexpensive to build intricate dies out of these complex steels, nor is it always easy to heat treat them to best advantage. But if sufficient care is maintained in the making of the die, in its heat treatment, and in its set up, exceedingly long life can be expected, with a minimum of die maintenance.

Other Die Steels

Many other steel compositions are used in metal stamping dies, but the ones discussed above represent by far the greatest consumption. Some of the other steels worthy of mention in passing are: (1) **the high-speed steels**, with both normal and lower carbon contents, which are gradually attaining prominence as die inserts in cold heading, and for certain types of trimmer dies, and (2) **the shock-resisting steels** usually containing nickel, which are sometimes used in metal forming dies requiring very great toughness with not too great wear resistance, such as in cold hubbing dies and certain types of coining and metal stamping and bending dies.

Heat Treatment of Die Steels

All die steels must be heat treated to

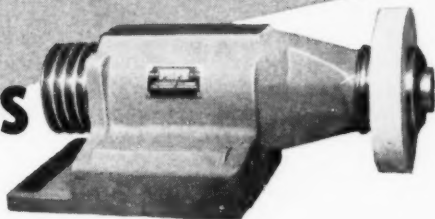
develop in them the properties for which they are used. In recent years great progress has been made in the science as well as in the art of heat treating. All too frequently the die designer or die maker does not appreciate the importance of correct heat treatment in developing the maximum of desirable properties, even though his first tendency when confronted with a die failure is to place the blame on the heat treater or on the steel itself.

Many shops which have their own heat treating facilities quickly become familiar with these problems; on the other hand, in some of them the heat treating set up is considered a necessary evil, a good place to cut costs to the bone, and to save capital expenditure by using obsolescent equipment and little or no pyrometry. Such a department is often a never-ending source of trouble, for while tool design, engineering and operation is taking advantage of the higher alloyed, higher grade steels being developed, the heat treat lags behind because they cannot get the equipment and facilities for handling the better steels to produce their best properties.

By far the greatest number of die shops, however, do not have hardening

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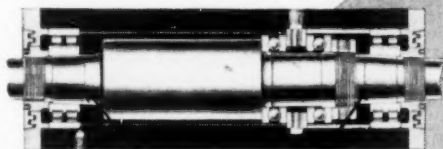


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facilities of their own, but put their faith in a commercial heat treating establishment. Commercial heat treaters, by and large, are able to do an excellent job on hardening die steels. They are aware of the necessity for control of surface condition, for minimizing distortion and size change, and for obtaining the hardness specified. However, they are not magicians, and cannot harden complex dies made of water hardening steel so that they are free of distortion, or obtain the desired hardness on high carbon high chromium air hardening steel, when the wrong grade is specified to them.

Simplified Theory of Hardening Steel

We must be eternally grateful to Mother Nature for endowing iron with two distinct and different atomic arrangements—one existing at room temperature (and again near the melting point), and one above the critical temperature. Without this phenomenon it would be impossible to harden iron-base alloys by heat treatment.

Briefly, what happens in the heat treatment of die steels can be represented graphically by figure 4. Starting in the annealed machinable condition at (A), the steel is soft, consisting internally of an aggregate of ferrite and carbide. Upon heating above the critical temperature to (B) the crystal structure of ferrite changes, becomes austenite, and dissolves a large portion of the carbide. This new structure, austenite, is always a prerequisite for hardening. By quenching it—cooling it rapidly to room temperature—the carbon is retained in solution and the structure known as martensite (C) results. This is the hard matrix structure in steels. It is initially highly stressed, for the transformation from austenite involves some volumetric expansion against the natural stiffness of the steel, so it must be reheated to an intermediate temperature (D) to slightly soften it and re-

lieve those internal stresses and strains that unduly embrittle the steel.

If quenching is not rapid enough, the austenite reverts to ferrite and carbide (E), and high hardness is not obtained. The rate at which quenching is required to produce martensite depends primarily on the alloy content. As we have seen above, low-alloy material is water or oil hardening, while highly alloyed steel usually can be hardened in air—quenched at a much slower rate. The high alloys make the reactions more sluggish.

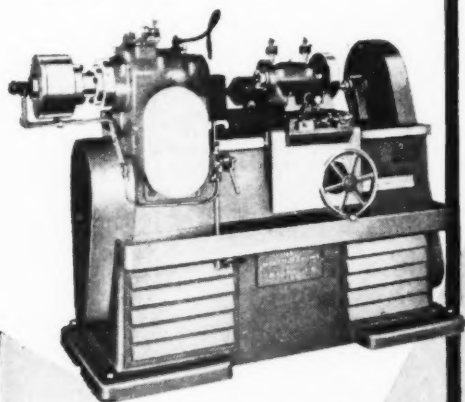
Throughout all these heat treating reactions most die steels retain excess, or undissolved carbides, which take no direct part in the hardening. The high carbon-high chromium steels, for example, have large quantities of excess iron-chromium carbide, as shown in figure 5, which give them in large measure the high degree of abrasion resistance possessed by this class of steel.

Indeed, the 4% vanadium steel owes



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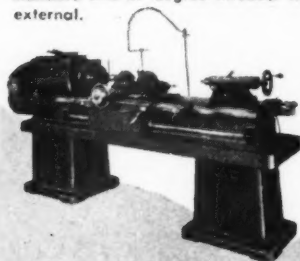


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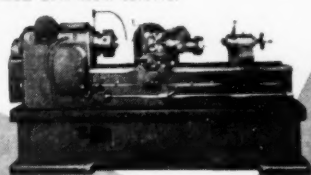
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its even greater abrasion resistance to the presence of excess vanadium carbide shown in figure 6. Vanadium carbide is exceedingly hard, having higher hardness than tungsten carbide, and even higher than the silicon carbide in grinding wheels.

Influence of Heat Treatment on Die Life

Figure 4 presents simply the basic hardening of steels. Each type of die

steel must be handled slightly differently from the others for optimum results. Different temperatures, different heating and cooling rates, and variable tempering procedures must be used. Such things as depth of hardening, grain size, cracking tendencies, and size change must also be seriously considered when setting up the detailed heat treating procedure for any given die.

The properties of die steels as de-

Turn Taper, Chamfer and Groove Aircraft Piston

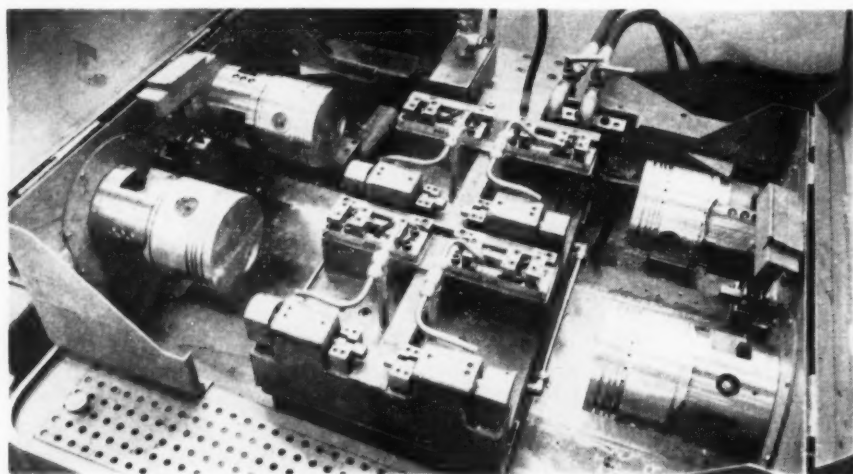
Boring on one end, loading and unloading on the other is the kind of doubling up which makes one machine do the production job of two.

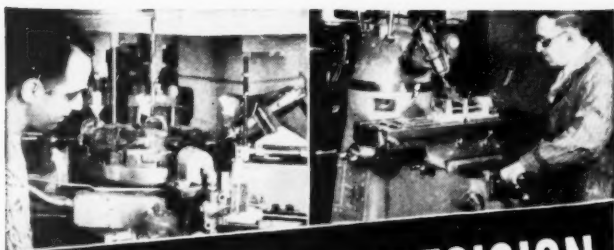
Parts are held in a rotating hook clamping fixture and are located on the rabbet diameter of the piston skirt. Hook arrangement holds part back against the shoulder adjacent to the rabbet diameter by a hook which swings up out of the way when unclamped.

For the taper turning operation a hydraulic cylinder is mounted on the rear of the fixture with a cam follower on the end of the piston. Cams are

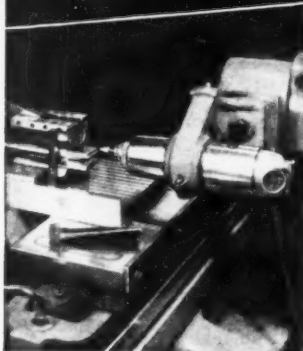
mounted on a bracket which extends from bridge to bridge. The cam follower rides the cam and controls tools mounted on cross slide. Chamfering follows turning operation. After which slide is reversed going back to an intermediate stop so that tool drag line is eliminated on the previously turned surface.

Operations are identical on both ends of machine and production is continuous since one end of machine can be unloaded and loaded while the other is being bored. Machine is a model 323 Heald Bore-Matic.





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veloped in heat treatment bear an important and direct effect on die life. In general, it may be said that the harder a given die the longer it will wear, while the softer a die the tougher it becomes. Thus, assuming the proper die steel is being used and no other factors are operative, dies which are wearing out should be made harder for improved life, and dies which are breaking or cracking should be made softer.

Care must be taken to analyze the real cause of failure. Frequently dies spall or break because they first become dull, and extreme pressures build up. This is evidence for increasing, not decreasing the hardness for added die life.

Within limits, heat treatment can be used to adjust these fine variables to best advantage. An oil hardening steel may work best on one application at Rockwell C 62, and on another in-

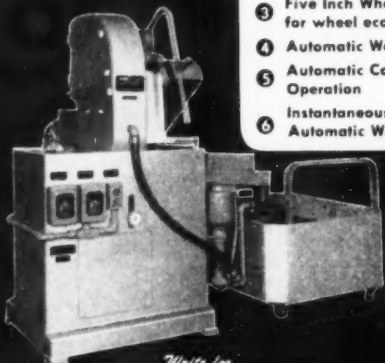
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volving higher stresses and shock at Rockwell C 58. Adjustments of the tempering temperature easily produces the hardness desired.

Hardness is not the only measure of effective heat treating, for it is possible to produce equivalent hardness in nearly all die steels by different combinations of hardening and tempering temperatures and times, and usually one of these is superior to the rest.

Many steels are very sensitive to slight overheating, their impact resistance and toughness dropping off considerably, yet the hardness may be virtually unaffected. There is no simple test to determine whether a die has been slightly overheated in hardening, though such symptoms as undue size change, abnormal response to tempering, or loss of magnetism frequently indicate it.

It is evident, therefore, that tempera-

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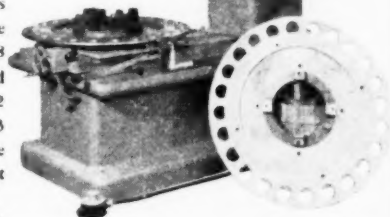
This Model E-2 with special column and special hand index table was designed by Cleveland to cut costs on a large jet engine part. 63 holes .250-28 and .375-24 are tapped on one side and 12 holes .375-24 and 3 holes .750-16 on the reverse side. 5 different bolt circles are used.

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ture control is of very great importance in heat treating, and every effort should be made to use the proper temperatures for each grade of steel as recommended. The mere presence of expensive pyrometers is not enough. They must be properly maintained and frequently checked for accuracy, for at the high temperatures involved in heat treating dies it is easy for the thermocouples to become contaminated and lose their calibration. Errors of up to 200° F have

been encountered from this source, yet the equipment appeared to be in good order.

Surface Control in Heat Treatment

Another extremely important factor in the heat treatment of dies to get maximum die life is that of surface control. This becomes vital on dies to be used unground or with a minimum of grinding and dressing after hardening.

Die steels are all high in carbon. The oxygen in the air, and the water vapor and carbon dioxide in burned fuel gases, rapidly attack the carbon on the surface of the steel at the elevated temperatures used in heat treating, unless the surface is adequately protected. The loss of carbon means loss in hardness, loss in desirable properties. No longer is the surface of the die the same alloy which was so carefully chosen, purchased, and worked into a die.

Surface protection has traditionally been provided by packing the dies, us-

ually in a mildly cast iron chips. Pack such as grey cast iron chips. Pack hardening does a good job but is expensive to use inasmuch as fuel must be consumed to heat not only the die but also the box and packing material. Considerable time is also expended in proper packing, but on the other hand hasty work results in poor protection and spoiled dies.

More modern surface protection is provided by the use of special muffle furnaces, wherein the dies are protected from contact with the combustion gases.

Intense Competition Coming

A period of intense competition throughout American industry which will spur plant modernization and replacement of obsolete equipment was forecast today by Swan E. Bergstrom, president of the National Machine Tool Builders' Association and vice-president of the Cincinnati Milling Machine Co., in his opening address at the Spring Meeting of the Association.



Swan E. Bergstrom

"If the present Administration really fulfills its promise of encouraging competitive enterprise," Bergstrom said, "and takes the steps which are necessary to enable people to attain the rewards of initiative and the risk of venture capital, I think there will be a wave of intense competition such as this country has not seen in years.

"The big question, the country over, is going to be, 'How can we get our costs down so that more people can buy our product?'

"That is where the machine tool industry comes squarely into the picture.

Our industry is the basis of all industrial productivity—and we have what it takes to cut costs.

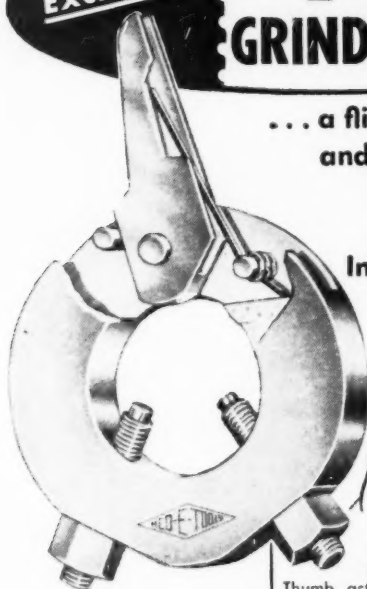
"If the manufacturers of America are to preserve prosperity at home, compete successfully abroad, and maintain a rising standard of living for the people, they must provide better goods at lower prices. This can only be done by the use of the most modern equipment.

"A big competitive drive—an urgent effort on the part of competitive companies to give people better values and thereby get more business—will lead to a whole new wave of plant modernization and replacement, provided our salesmen are on the job at the right place and at the right time, to demonstrate in black and white just what our new models are able to do in cutting costs."

Bergstrom cited as major problems of concern to the industry the need for revision of present Internal Revenue Department provisions with respect to depreciation, efforts to remove restrictions which today block the sales of American-made machine tools to foreign countries, and revision of present tax policies affecting business in general and capital goods industries in particular, which discourage the venture of risk capital.

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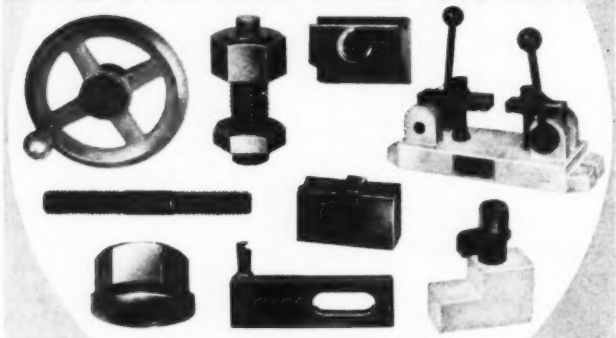
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Bridgeport 5, Conn.

and are surrounded by specially generated neutral atmospheres. Many atmosphere generators are used commercially today, most of them partially burning and reacting fuel gases to balance their composition to a neutral one between carburizing and decarburizing. On the whole, these are highly successful, and their use, when properly controlled, results in dies with unaffected surface chemistry ready to go to work.

Salt baths are also growing in popularity for hardening die steels. They have long been used for high-speed steels with great success, and when correctly used work out well for die steels also. The use of salt baths for treating dies does require very careful control, however. The highly alloyed air hardening die steels, for example, must be held at the hardening temperature much longer than either high-speed

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steel or the low-alloy die steels, to allow sufficient solution of the sluggish iron-chromium carbide in the austenite. The salt must be very clean, and properly rectified to avoid surface attack on the steel over these long periods.

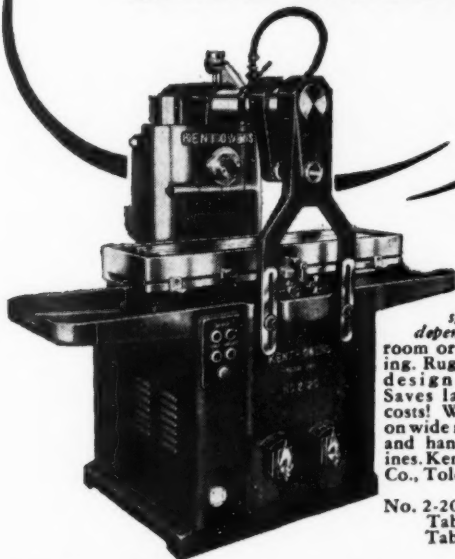
Another hazard in salt bath hardening is that of distortion resulting from the rapid heating obtained, which may cause non-uniform heating of different size sections; however, the use of prop-

er preheating normally takes care of this hazard.

Other Factors Contributing to Die Life

The useful life of a die depends on its tendencies to crack or to wear out, providing design does not become prematurely obsolete. Selection of the proper steel for best resistance, followed by stress and wear resistance, followed by its proper heat treatment, therefore

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represents a major consideration in obtaining good service from a die.

Even the best steel composition and most careful hardening, however, cannot always assure success. There are several other major factors that contribute in large measure to successful die building.

Die Design

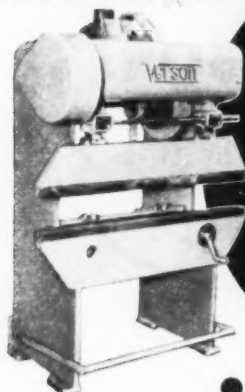
It is obvious that the most important

factor is die design. This article, being a study of die steels from a metallurgical point of view, is not concerned with the intricate engineering problems of die design and building, but it is well to point out some of the things often encountered in dies which complicate heat treatment and its effects, and that lead to premature failure.

Any design feature that builds up internal stresses in the die during heat treatment, or that creates mechanical

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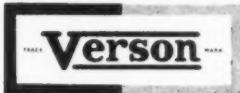
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stress raisers, should be avoided. Among the former are such things as thin steel sections adjacent to heavy sections, where, in quenching, the thin section is able to get cold and rigid long before the heavy section. If these are directly connected to each other, the transformation and thermal cooling stress are build up to very high levels in heat treating. This has the effect of reducing the possible safe operating stresses by an equal amount, preventing

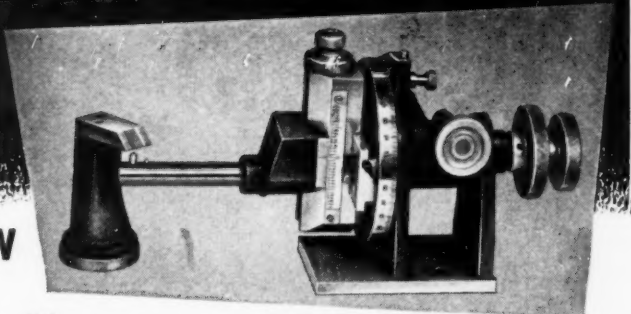
full utilization of the die and the properties built into the steel.

Another cause for premature die failure is the presence of sharp corners, or sharp re-entrant angles. These not only weaken the die structurally through acting as stress concentration areas during operation but also produce high stresses in heat treatment, in some extreme cases actually leading to cracking. It is agreed that sharp corners, edges and re-entrant angles often can-

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Now you can have precision within "tenths" and set up in one-fourth the time. Tangi-Matic has a direct-reading micrometer built in, eliminating "mikes", height gages, Jo Blocks and errors. Even novice operators obtain extreme accuracy. Tangi-Matic dresses any concave radius down to .032", full 180° with equipment we give you. Set-ups can now be made without removing dresser from your grinder chuck.

Our new model has removable dressing arm, permitting the use of extensions for dressing large wheels. Wearing surfaces are hardened, ground and lapped to a mirror finish, assuring you of years of extra service over ordinary dressers. Lead screw is hardened and ground to extreme tolerances. Furnished complete with master setting block, small radius attachment, plastic hood and carrying case. Write for literature and name of representative in your area.



PERFEX GAGE & TOOL CO.

122 Avery Street

• Mt. Clemens, Michigan

not be avoided; perhaps it is desired to blank a part which is to have a sharp edge.

In cases like this, all that can be done is to locate the stress raiser in such a way that its effect is a minimum, and then use every precaution in heat treatment to avoid undue distortion or cracking. In other cases, where the sharp angle is not required by die design, a fillet should always be used.

These are two examples of how die design might well influence die life through easing the problems in heat

treatment. It would be well if all tool and die engineers could obtain a clear understanding of the behavior of steel during its heat treatment, so they could make every effort to avoid creating conditions which heat treatment will render as weaknesses in the die.

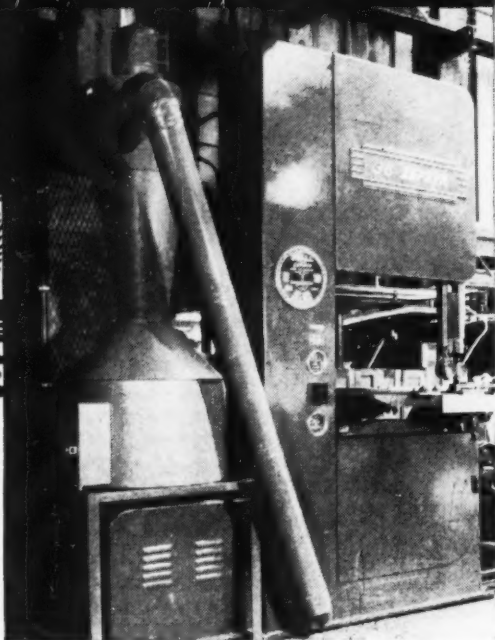
It is hoped that careful consideration of the generalities presented here, applied to any die problem, will result in a better understanding of the raw material of nearly all dies—die steel—and its heat treatment.

The End

TORIT DUST COLLECTORS



**WORK WELL IN
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Torit Dust Collectors are available in both cabinet and cyclone types, in sizes ranging up to 5 h. p.

Note how compactly this Torit 19 FB Dust Separator fits into unused space at the back of a Do-All band saw. It is completely out of the way yet so close to the work that piping, and attendant loss, is minimized. The operator reports a dust collecting efficiency of 99%, with plastic and hard rubber as well as metals.

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He is performing six consecutive drilling operations with a single jig at a single working station, with less handling time, and without changing tools. He is using the Lign-o-matic turret on a standard drill press.



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INCREASE PRODUCTION — Many users report more than 300% greater output in actual production. Turret indexes faster than tools can be changed or work moved to another spindle.

CUT COSTS — patented self-centering principle guarantees accuracy equal to drill press spindle. Lign-o-matic

reduces tool and jig wear, cuts worker fatigue; adds up to faster work with fewer rejects. All parts completely guaranteed for **TWO YEARS** against defective manufacture.

PRICE — Model D, 6 spindles with No. 2 Jacobs male taper **\$235.00**

DELIVERY — Currently, 2 weeks.

TRY IT YOURSELF at our expense. If you are not fully satisfied for *any* reason, return turret within 10 days and pay nothing.



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- ☐ Please send bulletin with complete information.

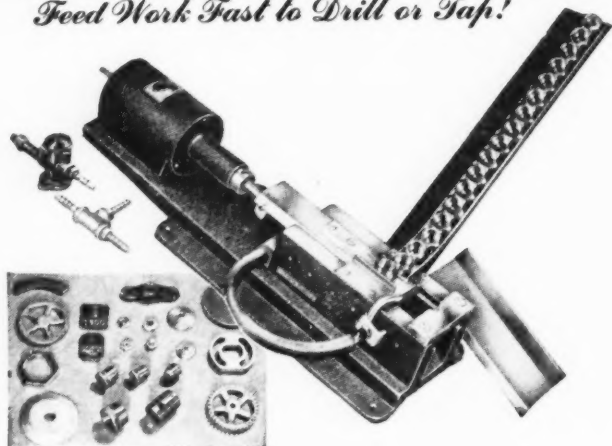
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(Attach coupon to company letterhead)

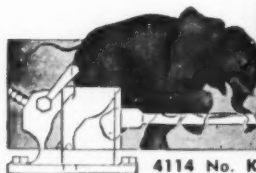
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see how this chemical emulsion takes over 85% of all metal cutting operations. For a demonstration in one of your own machines, just write us and we'll have one of our Cincinnati Milling-trained machinists call on you—without cost or obligation. Or, if you prefer, write for our free booklet, "CIMCOOL Defeats Heat." Address, Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

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CIMCOOL

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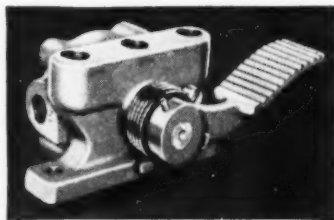
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NOPAK 3- and 4-Way Foot Operating Valves are used in many ways on many different types of equipment for the precision control of air power applied to various machine movements. Ask your NOPAK representative to show you other examples in the NOPAK Application Manual.



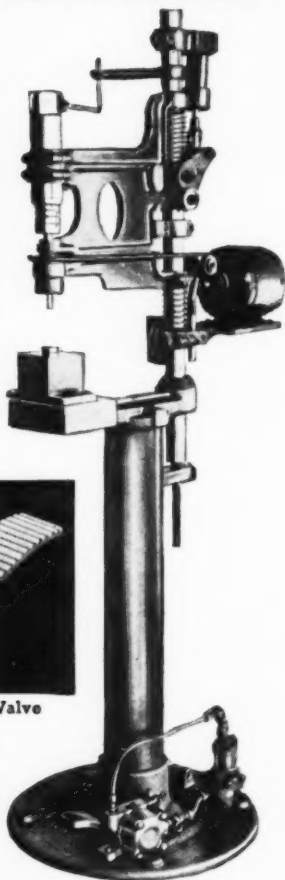
NOPAK Model "R" Foot Valve

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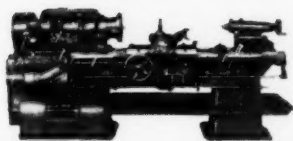


Featuring uniformly hardened and precision ground bed ways.

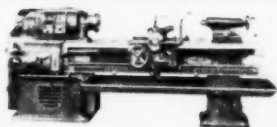


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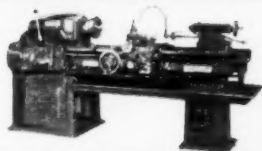
18" — 20" — 24" 12-speed Geared Head Lathes



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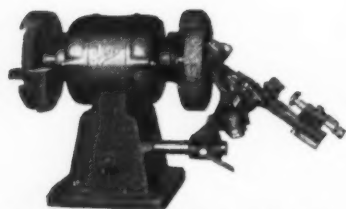


Drill Grinder with $\frac{3}{8}$ inch capacity holder on left and $2\frac{1}{2}$ inch on right side. Can also be furnished with a general purpose grinding wheel on left end instead of the small drill holder. Also available for wet grinding.

A POINT TO REMEMBER

A drill point that is sharp and correctly ground will—

- (1) drill to exact size
- (2) drill faster
- (3) drill more holes per grind
- (4) require less power
- (5) reduce breakage
- (6) cost less to regrind
- (7) increase life of drill as less metal is removed each time drill is sharpened



Bench type Drill Grinder with $\frac{3}{8}$ inch capacity holder. Also made in $1\frac{1}{4}$ inch capacity Pedestal type.

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Write for catalog 72 BG today!



**A special report
by the editors of
MACHINE and TOOL
BLUE BOOK**

Report number 30

Tool and Cutter Grinders, concluded Grinding Machines . . . part 4

This is the thirtieth in a monthly series of special reports discussing various types of machine tools. Included in this month's special report on grinding machines are:

1. Flat surface disc grinders.
2. Descriptions of late model grinding machines.
3. Specifications of American-built machines.

Previously published reports discussed: 1. Thread Rolling; 2. Power Press Brakes; 3, 4, 5. Milling Machines; 6. Honing, Lapping, and Superfinishing; 7. Automatic Screw Machines; 8. MAPI Replacement Formula; 9, 10. Chucking Machines, Turret Lathes, Hand Screw Machines; 11. Broaching Machines; 12. Shapers, Slotters, Keyseaters; 13, 14, 15. Lathes; 16. Planers; 17. Gear Making Machines; 18, 19. Boring Machines; 20, 21, 22, 23, 24, 25, 26. Drilling Machines; 27, 28, 29. Grinding Machines.

Surface disc grinders

By **Sidney M. Napp**,
Chief Engineer
Besly-Welles Corp.
Beloit, Wis.

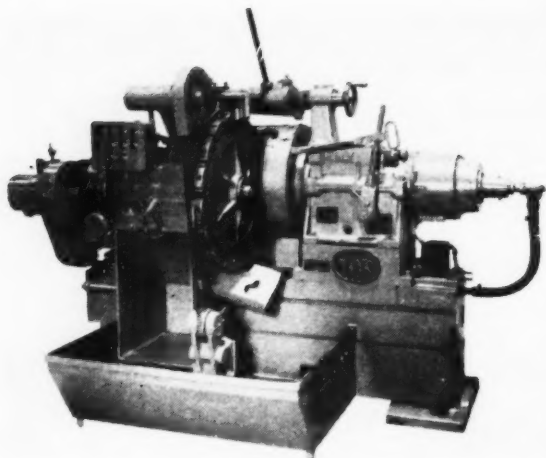
ALL DISC grinders are basically alike in that the work being ground is presented to the flat face of the abrasive disc rather than the periphery. This article pertains exclusively to this class of grinding machines and is intended to explain the following three important considerations:

1. Field of application
2. Basic types of Disc Grinders

3. Types of tooling.

A particular machining operation may be successfully performed on several totally different types of machine tools. The final finished operation may be equally acceptable and within manufacturing tolerances from any of the machining methods employed. For example: a cylindrical shaft could be produced by shaping, planing, milling, grinding, turning, etc. Most likely a turning operation would be the considered selection because of the basic correctness, ease of operation, speed, accuracy, and over-all lower costs.

1. A Double Horizontal Spindle grinder arranged to grind two parallel sides of automatic transmission hand ends.



Similarly, a flat surface may be produced by many different machining methods and each method offers distinct advantages peculiar to itself. A thorough understanding of machining methods is a must if products are to be produced to meet the challenge of today's competition.

It is our hope, in this article, to present a clearer picture of the disc grinding method of producing flat surfaces.

Field of application

First let us say: Any flat surface offers possibilities for flat surface disc grinding. It is always wise, for several reasons, to consider disc grinding whenever flat surface finishing is required.

The ability of an abrasive disc to remove stock rapidly has been clearly demonstrated in many hundreds of successful installations. Thousands of cutting points of the abrasive disc contact the work simultaneously, each removing a chip. This process develops the entire surface at one time continuing down to the desired finished dimension, rather than a highly localized point of stock removal as obtained from single point type tools. This over-all development of surface finish tends to reduce

distortion caused by the relief of internal stresses during removal of surface material and contributes to a more rapid development of the flat surface desired.

Surface finish can be kept under control by the selection of proper wheels. It is not necessary and many times undesirable and costly to produce a very high finish in order to obtain a flat surface. It is possible by disc grinding to produce a range of finishes from coarse to very fine approaching the smoothness of lapped surfaces.

Indirect benefits

Bear in mind, parts can be ground either before or after heat treatment. In the latter case, substantial savings are often obtained and in many cases the elimination of a preliminary machining operation, before heat treatment, may in itself effect sufficient savings to pay the cost of the installation. In this connection, simplification of processing and reduced material handling are also benefits automatically gained.

Still another substantial saving may be obtained by the elimination of the need for subsequent operations such as

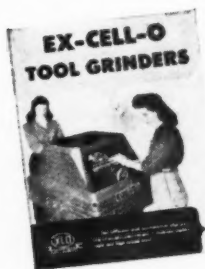
Tool Grinders by Ex-Cell-O



STYLE 44-A, Ex-Cell-O Precision Carbide Tool Grinder. A new model for sharpening single point tools. Inbuilt motor precision spindle. Ample pressure coolant flow.

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A complete line of grinders, for efficient and economical sharpening of single point tools. All are double-end models using cup type wheels; with large tool rest tables, easily adjusted.

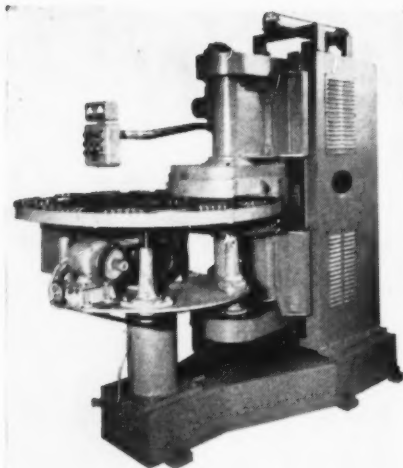


WRITE FOR THIS BULLETIN

It shows and describes five models; also gives important data on tool grinding. Address Ex-Cell-O in Detroit; ask for BULLETIN 46262.

**EX-CELL-O
CORPORATION
DETROIT 32,
MICHIGAN**





2. A Double Vertical Spindle grinder designed to grind the parallel ends of coil springs.

lapping, deburring, scraping, etc. This happens often enough to warrant serious consideration of the disc grinding process.

Materials

Almost all known materials can be disc ground and many materials can only be finished by grinding. This may be due to extreme hardness or to other

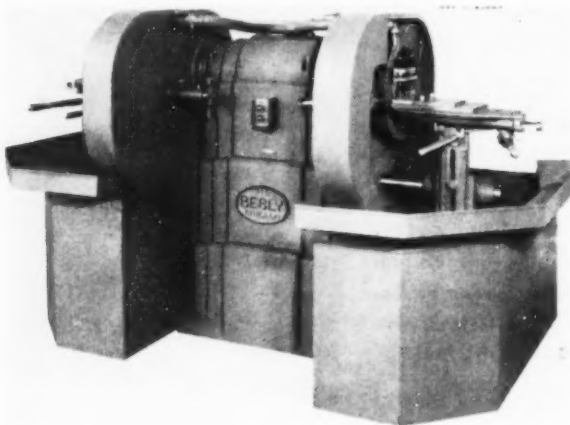
characteristics such as inability to withstand intermittent cuts or cutting tools impact. Other materials may not have sufficient rigidity to withstand holding pressures imposed by fixturing and cutter pressure.

Such problem materials as ceramics, glass, carbides, rubber, cork, gems, magnetic alloys like alnico and heat treated steels, to name a few, can all be successfully disc ground on a production basis.

Thin walled castings which often present distortion problems are ideal disc grinding jobs.

First operation Surfaces

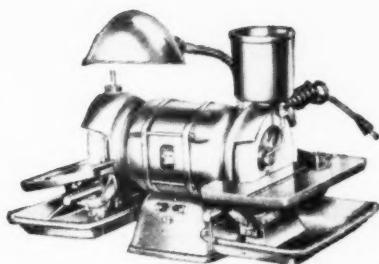
In cases where a flat surface is required for reference or location for subsequent operations, disc grinding may be the ideal method for surfacing. Several standard machines are available for this type of operation. The vertical spindle, horizontal disc (tub grinder) is often employed for first operation surfaces, usually where no close relationship must be held with other surfaces. In some cases the work is placed face down on the abrasive disc and allowed to grind by gravity pressure. At other times pressure weights or springs are applied to speed stock removal or to control pressure in localized



3. Single Horizontal Spindle grinder equipped with geared lever feed tables and fixtures to grind connecting rod caps and valve lifters. Production is 90 pieces per hour.

Baldor

BALL-BEARING GRINDERS



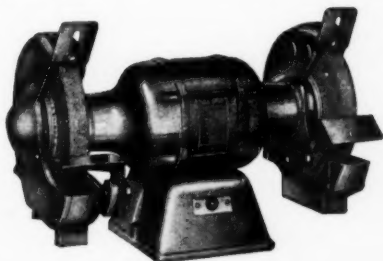
Clip this ad and mail for bulletins on Carbide Tool Grinder.

CARBIDE TOOL GRINDER FOR PRECISION WORK

The $\frac{1}{2}$ hp motor that powers this Baldor Carbide tool Grinder has no commutator, no centrifugal switch, no brushes—a really trouble-free motor that will not burn out even when overloaded repeatedly. Electronically balanced within 1/50 ounce of perfection, the armature rotates at 3400 RPM without vibration—an engineering achievement that makes true precision work possible. Complete price, **\$143.60** as shown.

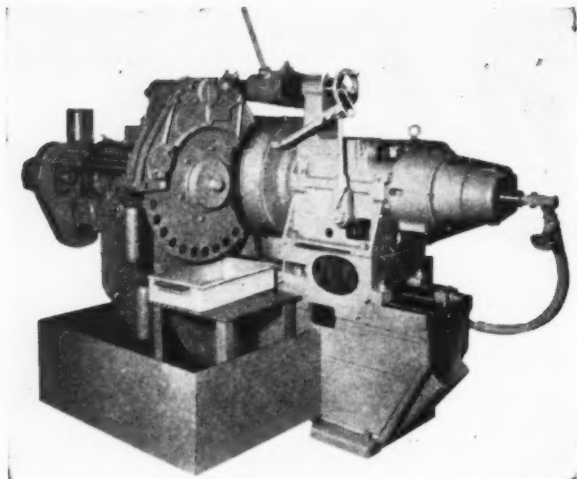
NEW BALDOR W-I-D-E CLEARANCE GRINDER

Baldor is a basic manufacturer of Grinders— even the motors are built by Baldor. The new streamlined grinder, 8200 series, is excellent for grinding long and odd-shaped pieces as there's plenty of clearance between the wheels and the motor frame. $\frac{1}{2}$ hp, 3450 RPM, capacitor-start, capacitor-run motor GUARANTEED 2 years against burnout. Baldor makes a complete line of 6"-12" general purpose bench and pedestal grinders. Complete price as **\$86.00** shown.



*Note exhaust type guards.
Ask for Bulletin 353*

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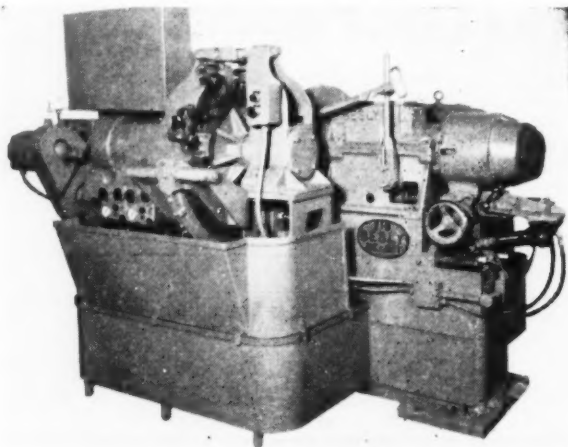
4. Wet Double Horizontal Spindle grinder with rotary fixture and double weight pusher type feeder.

areas. The work can be rotated during the grind when required. Here, the work is placed into retaining holders which rotate as they travel around the abrasive wheel. The advantages gained in this type of operation are flatness, higher production and more even abrasive wear.

Parallel surfaces

Parallel surfaces can often be dis-ground simultaneously. This is espe-

cially true when the two faces are approximately equal in area. Double spindle horizontal as well as vertical machines are available for this operation. Figure 1 shows a double horizontal spindle grinder arranged to grind two parallel sides of automatic transmission band ends. Figure 2 is a double vertical spindle grinder designed to grind the parallel ends of coil springs. From a tooling standpoint the cost of the work holding mechanism is likely



5. The Universal Joint Cross grinder equipped with rotary feed wheels with clamping type fixture for holding the work.

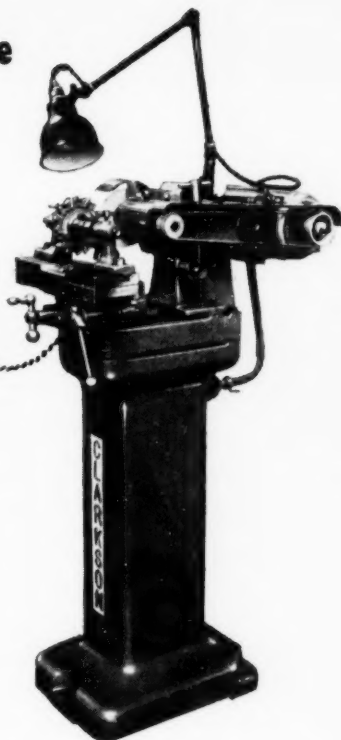
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Simplicity . . . Speed . . . Economy are featured in the Clarkson Cutter Grinder . . . designed specifically for use in the manufacture of Clarkson Milling Cutters. All of the desirable features recognized as essential through years of experience, to the manufacture of cutting tools are incorporated into the Clarkson Cutter Grinder, yet it is low in cost, *right* for use in your plant for resharpening

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Please send full information and prices on the
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DEBLOCK CHUCKS • AUTOLOCK CHUCKS • MILLING CUTTERS • CLARKSON CUTTER GRINDERS

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to be comparatively inexpensive, while at the same time, two surfaces can be finished as quickly as one. These are substantial benefits of which you may be able to take advantage when considering your flat surface finishing operations.

Sequence operations

If you have sequence flat surface finishing operations, there is a disc grinder ideally suited for this type of work. Generally two rotary work tables are provided, each fixtured to present a different work face to the abrasive wheel. The first operation grind may be required to locate from a rough surface or from previously finished points while the second operation grind may use the first finish for location, giving assurance of good support and close relationship of finished surfaces.

Another type of grinder well adapted to grinding single surfaces held in very close relationship with other surfaces features a single rotary work table and a single vertical grinding spindle. These grinders have been used extensively for finishing such parts as alnico magnets, mower sickle sections, ledger plates, etc.

As with other types of grinders, automatic loading and unloading units are available for many classes of parts.

Single horizontal spindle grinders

This type grinder is normally built with a disc wheel mounted on both ends of the spindle with either a direct motor drive or a multiple "V" belt drive from a motor mounted on the rear of the base. They are built in a range of sizes to handle a variety of work from light to heavy and can be equipped for either wet or dry grinding operation.

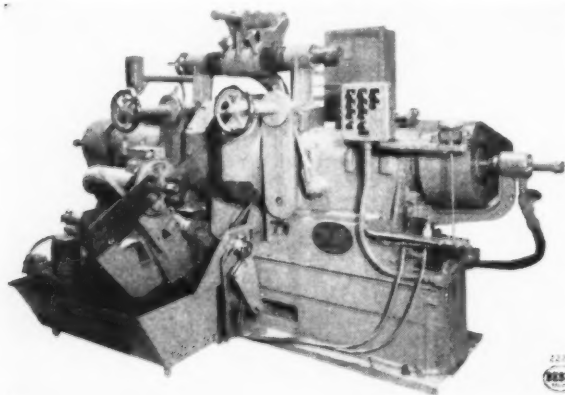
Tooling

Generally these grinders are equipped with geared lever feed tables on which various work holding fixtures are mounted. Figure 3 shows this type of grinder equipped with lever tables and fixtured to grind connecting rod caps.

Often one table is arranged for a first operation grind while the other table accommodates a second operation.

In some cases a plain table can be used to advantage for free hand grinding operations.

To increase the efficiency and usefulness of this type of disc grinder, mechanical oscillation can be added to the work tables. This frees the operator during the actual grinding period, enabling him to check the work after grinding.



6. An oscillating type of fixture. This type of tooling is generally lower in cost than others but not as productive.

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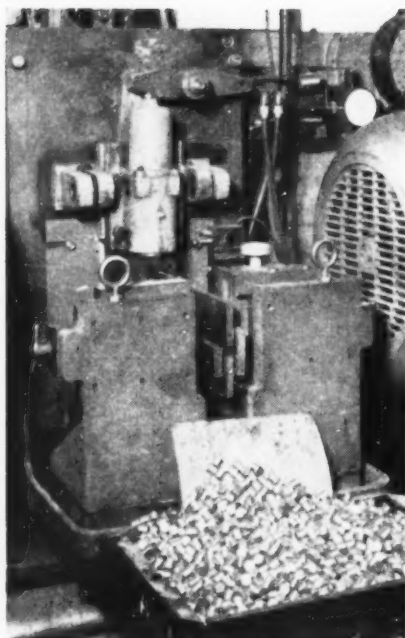
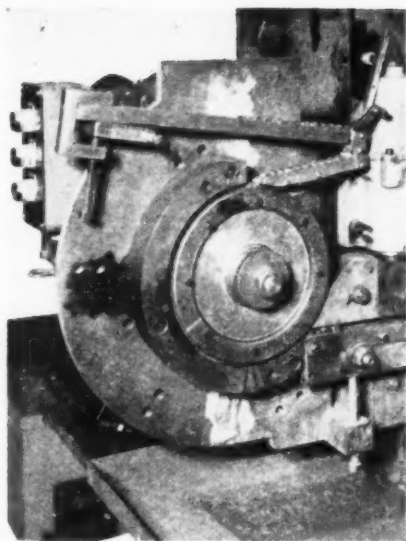
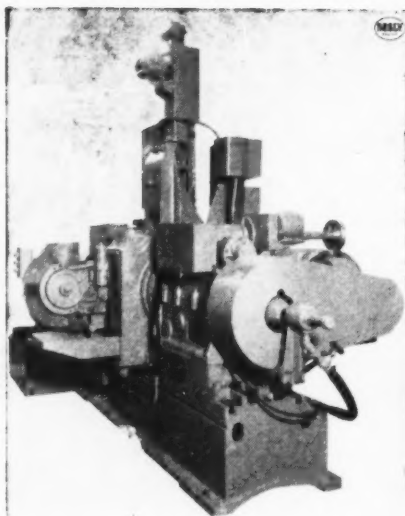
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7, 8, 9. Through type feeder. This is employed only with double spindle disc grinders and is generally recommended for high production work. Basically, the unit consists of a feeding mechanism, a set of through guides and a discharge unit.

Double horizontal spindle disc grinders

The Double Horizontal Spindle Disc grinders are also designed and built in a range of sizes to accommodate a wide variety of work. Generally two abrasive wheels are mounted face to face on the inner ends of the machine spindles. This grinder type is ideally suited to grinding two flat parallel faces simultaneously, the work being passed between the wheels during the grinding operation.

Tooling for double horizontal spindle grinders

Three main types of fixtures or feeding mechanisms have been developed for the double disc type grinders. Each type is pictured and described below:

Take the advise of one who knows!
**When you replace your old Spindle or
when you order a new Surface Grinder**

**specify
WHITNON
SPINDLES**

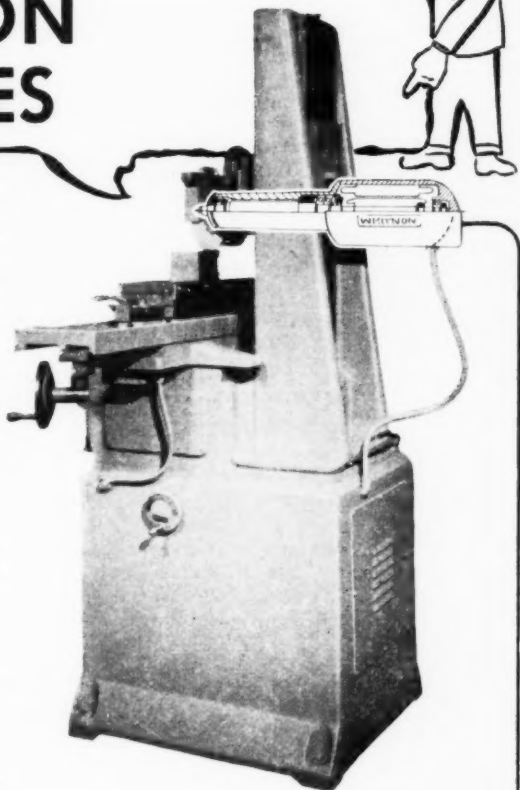
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Constant adjustment from spring preload keeps spindle rigid regardless of wear or temperature change.

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*Inquire today, specifying machine,
voltage, frequency and phase.*

THE WHITNON MANUFACTURING COMPANY
217 HIGH STREET NEW BRITAIN, CONN.



Rotary type fixturing

As may be seen from figure 4, the work to be ground is carried between the abrasive wheels. Special fixtures must be designed to accommodate the work piece.

In some cases, simple circular blades are used with openings to receive the work pieces. With this type of feed wheel the work is free to move sideways or float in the openings. Side guides or shrouds are provided to retain the work in the feed wheel openings until the abrasive wheels are reached. In general, this type of feed wheel is employed for the thinner range of work pieces. Automatic loading and unloading can easily be adapted with this type of fixturing.

At times it is desirable to equip the rotary feed wheels with clamping type fixtures for holding the work. The Universal Joint Cross grinder, figure 5, is a typical example of this type.

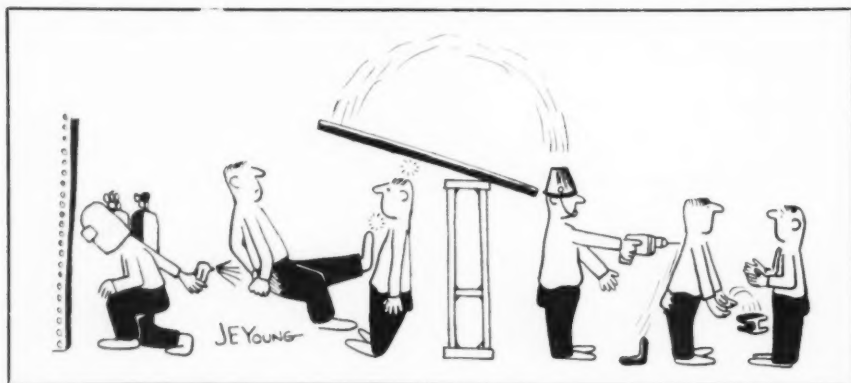
At times, rotary feed wheels are built to accommodate two pieces positioned "back to back" in order to take full advantage of the double disc grinder production potential. Right and left hand parts can be handled this way. As a word of caution, it should be borne in mind, the two faces which are simultaneously ground should be

of approximately equal area, in order to assure balanced grinding pressures.

Oscillating type fixturing

Referring to figure 6, an oscillating type fixture is pictured. This type of tooling is generally lower in cost than others but not as productive. The oscillating fixture operates as follows: the work holding portion may be a simple cutout in a blade which retains the work but allows it to float sideways, or it can be a clamping type fixture. This work holder unit is attached to an oscillating arm which in turn is attached to the grinder base by a pivoting type support, allowing the upper end or fixture portion to oscillate through an arc. This oscillation carries the work between the abrasive wheels. In certain cases, the work is sheared between the abrasives and reduced to size almost at once. It is possible to do this where stock removal is not excessive and the material being ground is free machining. In other applications, the abrasives are opened up and progressively closed on the work as the grinding progresses. Automatic controls are available to do this. By this method of grinding, it is possible to hold very close tolerances for size, parallelism and surface finish.

Fixtures of the oscillating type are



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many and varied, and much space would be required to describe them all. Some are simple hand operated units which will accommodate a single work piece while others are power oscillated pneumatically, hydraulically or mechanically, depending on the preference of the user and the nature of the work being ground. Work holders can accept a multiple of parts when conditions permit. Coil springs, for example, are squared on the ends in multiples. The fixture can be of an indexing type, permitting loading at one end while grinding is in progress at the other.

Through Type Feeders

This type of feeder is employed only with double spindle disc grinders and is generally recommended for high production work.

Basically, the unit consists of a feeding mechanism, a set of through guides and a discharge unit, figures 7, 8, 9. The work being ground is fed through the grinder from front to rear in a continuous column. The feed mechanism may be either manually or automatically loaded but is usually loaded automatically because of the higher production rate.

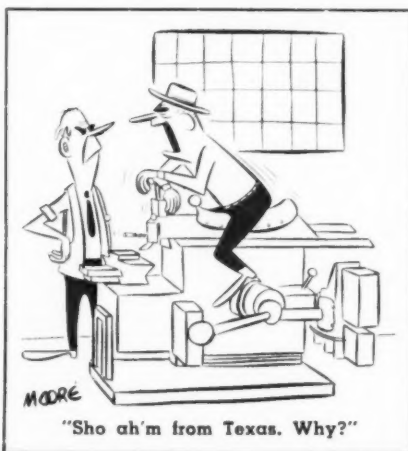
The work is transferred from the feeder into a set of guides which confine the parts top and bottom and on two sides. The side guides retain the work pieces between the top and bottom guide bars up to the abrasive wheels. When this point is reached the work passes between the abrasives where the two parallel faces are ground. The top and bottom through guide bars form a track between which the column of parts pass as they are forced through the grinding zone. A set of side guides are positioned at the rear of the grinder to retain the work as it passes out from between the abrasives. The finished work pieces continue on out from between the guides and into a discharge pan, belt conveyor or other means for carrying away from the grinder.

Such parts as ball bearing races, bearing rollers and piston rings are typical double surface parts which are finish ground at high production rates.

Accuracy

Accurate dimensional control, flatness of surface form and finish are factors which can be controlled to within extremely close limits in disc grinding. Piston rings which are very fragile and easily distorted are disc ground on the two flat parallel faces simultaneously at a rate up to 450 rings per minute. The sides must be flat, parallel and have a very fine finish. The width tolerance must be held to close limits. What other machining method could possibly equal disc grinding for this type of work?

In answer to the question: Can it be disc ground? let us say, if the part has a flat surface to be finished which can be presented to the flat face of the abrasive wheel without interference of extensions, it can probably be disc ground, regardless of material, finish, and accuracy, faster and more economically than by other methods of flat surface finishing.



Descriptions of late model tool and cutter grinders

Ingersoll cutter grinder

This cutter, made by the Ingersoll Milling Machine Co., Rockford, Ill., was designed to facilitate the proper grind-

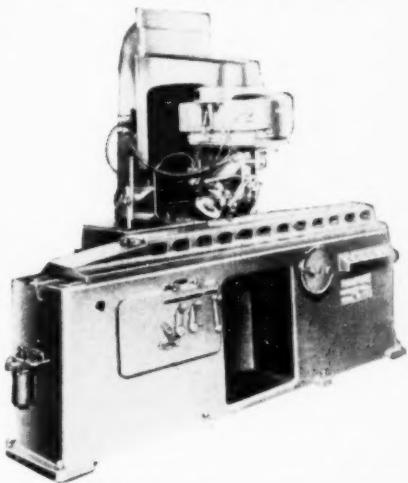


ing of inserted blade milling cutters. The face, periphery and corners are ground in a single setting, with cutter mounted on the grinder exactly as it will be mounted on the machine. The grinding wheel spindle is always in the same plane with the axis of the cutter. The spindle can be locked at an angle in this plane when grinding a bevel, or it can be rotated in an arc when grinding a radius.

The method of mounting the cutter assures accurate grinding of the teeth in correct relation to the axis and the mounting face of the cutter. Spin-grinding attachments speeds up grinding of blades to uniform height before sharpening.

Thompson 6"x48" broach grinder

This fully automatic broach grinder, made by the Thompson Grinder Co., Springfield, Ohio, is arranged for grinding the front tooth rake angle on flat broaches. The table and wheel head movements are entirely automatic. Tooth location is governed automatically by a switch which maintains tooth spacing and assures that each tooth is ground to remove correct position of material. This machine can be converted to round broach grinding.



The round broach (machine not illustrated) is rotated between centers by means of a motor driven changeable speed head stock. The automatic tooth locator is mounted on a bracket at the front center of the machine and is set in the correct position with the grinding wheel as in the case of surface broaches.

Worcester drill grinders

Two Worcester drill grinders made by Worcester Polytechnic Institute, Wash-

burn Shops, Worcester 2, Mass., will correctly grind twist drills, flat or chucking drills and flat twisted drills without removing them from their sockets and will accommodate that class having shanks larger than the body of the drill itself. The lip rest requires no adjustment if the drill is standard but is adjustable for irregular shaped drills. A stop pin attached by chain is inserted in the holder when grinding three and four lip drills.

The drill is supported in Vees at points as far apart as the length of the drill will allow.

The rear vee slides easily to accommodate long or short drills, and drills with square or odd shaped shanks. As the drill is supported near its ends, a large portion of it is always accessible, which admits of quick and positive handling.

Dumore drill grinder

This Dumore grinder, made by the Dumore Co., Racine, Wis., sharpens all 2-lip twist drills, No. 70 to $\frac{1}{4}$ ", including crankshaft drills. It is capable of grinding a drill point to any included angle from 90° to 150° , and any clearance angle from 5° to 15° . Broken drills can be reclaimed and sharpened. This grinder uses only the wheel face for sharpening, shaped wheels are unnecessary. The drill is held rigidly in

correct position, eliminating possibility of errors. A dial is provided for the selection of proper clearance angles; a thumb screw selects the desired drill point angle. Collets are selected according to drill size.

H & G chaser grinder

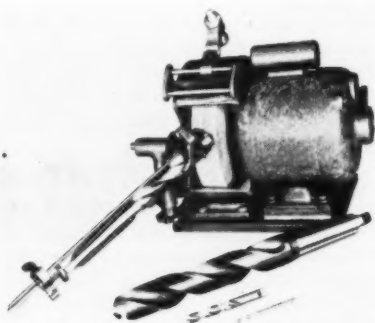
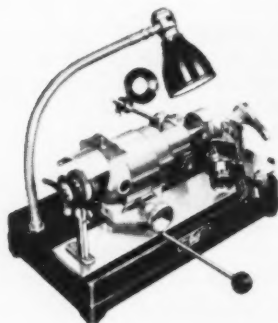
This two-wheel chaser grinder, made by the Eastern Machine Screw Co., New Haven, Conn., is available in a bench or pedestal model. The wheel and fixture on the left side of the grinder are used for regrinding the chamfer. The fixture is adjustable for any required chamfer angle. The wheel and fixture at the right are used for grinding the cutting face. This fixture clamps the chasers on a tilting table that is provided with an adjustable straight edge. The table can be tilted to provide the required hook.

Tables may be raised or lowered by hand wheels. Cross feeds are provided.

Alden twist drill grinder

The Model 200, made by Alden Industries, Cuyahoga Falls, Ohio, requires only two holders to sharpen all sizes of straight- or taper-shank twist drills from $\frac{1}{8}$ " to $1\frac{1}{2}$ ".

An infinite range of point angles for drilling different kinds of materials is obtained by a one-knob adjustment. The grinder is calibrated for the standard 59° point, as well as other fre-



quently used points, such as 90°, 130° and 140°. A uniform grind on each lip is assured by exclusive Alden action. Compensation for wheel wear is made automatically and a built-in diamond wheel dresser is standard equipment.

Clarkson Cutter Grinder

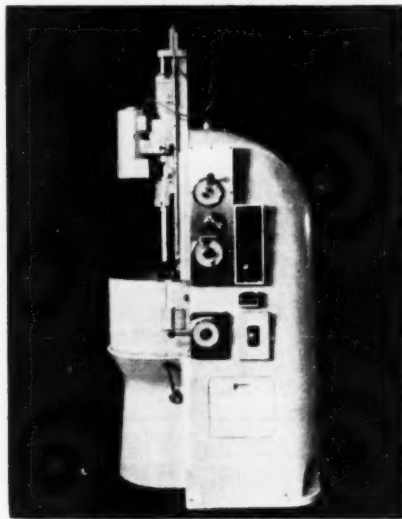
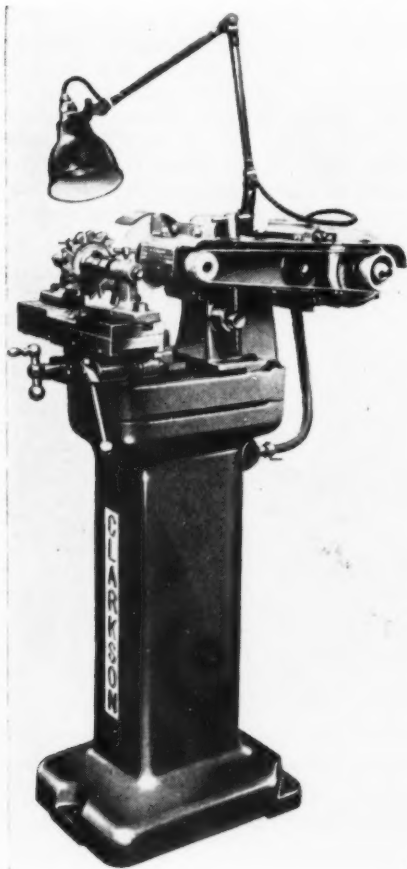
With this machine, made by Clarkson, Inc., Toledo, Ohio, cutters can be set and completely sharpened in from 15 to 25 minutes according to type. Powered by a ½ h.p. 2800 r.p.m. motor, grinder is always operated from the

front, placing the work in easy view of the operator. A lamp is adjustable at any angle and provides concentrated illumination of the work. Equipment can be supplied to permit all straight and morse taper shank cutters to be sharpened and all size side and face cutters up to 6" diameter with 1" diameter and 1¼" diameter holes.

The machine is used for sharpening end mills, slot drills, reamers, woodruff cutters, tee slot cutters, side and face cutters, cylindrical cutters, face mills, angle cutters and hollow mills.

Springfield vertical universal grinder

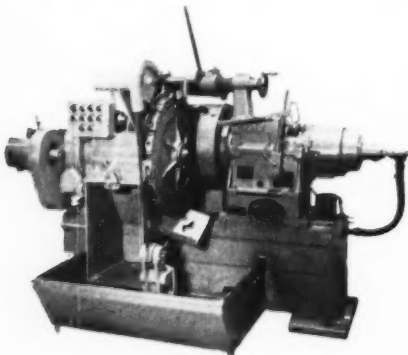
In this machine, made by the Springfield Machine Tool Co., Springfield, Ohio, the work is set down on a solid spindle. There is no gravitational pull on the parts to throw work out of line or help cause vibration. Work visibility is improved. Machine is capable of grinding internal and external diameters, shoulders or faces, or angles all at one setup of the work. Grinders may be fitted to a wide range of grinding spindles which can be easily changed.



Machine is completely hydraulic. All slideways are above the grinding wheel. The work spindle is a completely self-contained unit, mounted on ultra precision antifriction bearings and is driven through a V-belt drive by a fluid motor. Infinitely variable speeds are provided from 0 to maximum r.p.m. Spindle nose is American Std. type A-1.

Besly-Welles double spindle grinders

This machine has a hole drilled through the spindle for delivering coolant to the work. Lubrication of the spindle bearings is by means of the splash system. The sleeves have 2" to 4" of lateral movement controlled either

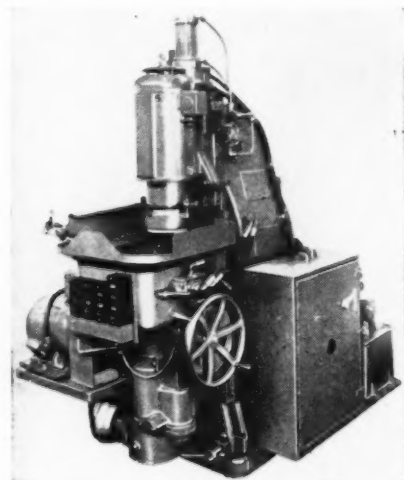


by hand through rack, pinion and ratchet lever, hydraulic cylinder or spring feed. The spindle head is designed so that it may be adjusted both vertically and horizontally, thus allowing perfect alignment of the grinding members or misalignment if it be required. Another feature is the device that limits outward movement of the spindle when the machine is in operation. By making a slight adjustment

the spindle can be moved outward by hand when it is necessary to pass the dresser arm between the grinding members to true the wheels. Machine is made by Besly-Welles Corp., Beloit, Wis.

Walker vertical stroke grinder

A salient feature of this machine, made by O. S. Walker Co., Inc., Worcester, Mass., is that the work table may be tilted left to right 15° for beveling. Also, the table may be tilted front to back 7°, making it possible to grind concave or convex. Flat grinding and concave, or convex is possible. Hydraulic travel of the head to working position is rapid traverse; then, at any given point above the work rapid traverse comes to the positive grinding feed. Fingertip control of spindle, work table, and coolant pump is located in front of the operator. The grinding cycle can be governed by a foot treadle as specified.



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Besly-Welles Corp.
Beloit, Wis.

Type and Model	D = Diameter of Steel Disc Wheel R = RPM Disc Wheel	M2 = Max. Opening Between 2" Thick Wheels M1 = Max. Opening Between 1" Thick Wheels	Type of Spindle Feed F = Dia. of Feed Wheel L = Length, Width, and Height	Horsepower W = Wheel Speed (s.f.p.m.)
Disc Grinder Double Horiz. Spindle				
No. 212	D = 12", 15", 18"	M2 = 8 1/2"	Hand, Spring or Hydraulic	3 to 5 h.p.
No. 218	D = 18", 20", 23"	M2 = 17"	do	5 to 15 h.p.
No. 226	D = 23", 30", 54"	M2 = 17"	do	15 to 30 h.p.
No. 254	D = 42", 53", 72"	M2 = 30"	do	30 to 50 h.p.
Single Vert. Spindle				
No. 318	D = 18"; R = 1160	—	—	5 h.p.
No. 342	D = 30"; R = 809	—	—	15 h.p.
do	D = 42"; R = 584	—	—	20 h.p.
No. 372	D = 54"; R = 452	—	—	25 h.p.
do	D = 72"; R = 346	—	—	40 h.p.
Double Vertical Spindle				
No. 905	D = 16" or 18"	M1 = 4"	D = 25 1/2"; 31 1/2" L = 42" x 42" x 70"	3 h.p.
No. 918	D = 20" or 30"	M1 = 8"	D = 48"; 60" L = 114" x 78" x 96"	5 to 15 h.p.
No. 928	D = 30"	do	D = 60"; L = 114" x 78" x 96"	15 h.p.
No. 926	D = 42" or 53"	do	D = 84"; 89"; L = 142" x 112" x 144"	15 to 25 h.p.
Radial Head Face Grinder				
No. 705	D = 6"-8" (abrasive)	Grinder Height = 70"	Base dia. = 36"	3 to 5 h.p. W = 4400
No. 707	D = 10"-12" (abrasive)	Grinder Height = 72"	Base Dia. = 49"	7 1/2-10-15 h.p. W = 4400
No. 710	D = 14"-18" (abrasive)	Grinder Height = 96"	Base Dia. = 66"	15-30 h.p. W = 4400
Single Horizontal Spindle				
No. 5	D = 15", 18";	T = Table Size 6" x 10"; 7 1/2" x 10 1/2" 6" x 10"	S = Length of Spindle 20 1/2"; 23 1/2"	3 h.p.
No. 205	D = 15", 18"	T = 8" x 11 1/2"	—	3 to 5 h.p.
No. 210	D = 15", 18", 20", 23"	T = 8" x 11 1/2"	—	5 to 7 1/2 h.p.
No. 208	D = 20", 23", 26", 30"	T = 10" x 13"	—	7 1/2 to 10 h.p.
No. 214	D = 30", 40"	T = 10" x 14"	—	15 to 25 h.p.

Clarkson, Inc.
Toledo, Ohio
Cutter Grinder

Machine sharpens cutters from 1/8" dia. end mill to large side and face cutters up to 6" dia. with 1" dia. and 1 1/4" dia. holes. Horsepower is 1/2, 2800 r.p.m.

The Eastern Machine Screw Corp.**New Haven, Conn.****Choser
Grinders**

Available in bench and pedestal. Floor space, 20" x 20".

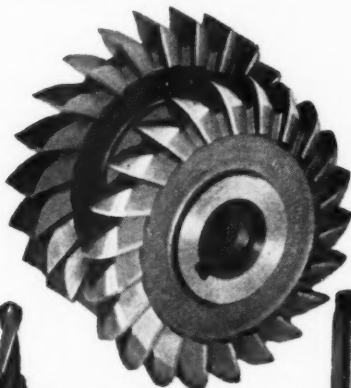
The Dumore Co.**Racine, Wis.****Drill
Grinder**One bench model. Capacity $\frac{1}{2}$ " to No. 70. Sharpens all 2-flip twist drills. Grinds drill points to any included angle, 90° to 150°. Clearance angle from 5° to 15°. Horsepower is 1.5.**Worcester Polytechnic Institute, Washburn Shops****Worcester 2, Mass.**

Type and Model	C=Capacity L=Length of drill	Wheel C=Cup Wheel G=Grinding Wheel	Adjustment of Angle at Drill Point	Remarks
Drill Grinder No. OEM	C= $\frac{1}{8}$ " to $2\frac{1}{2}$ " L=20"	C= $9\frac{1}{2}$ " x $1\frac{1}{2}$ " x $1\frac{1}{2}$ " G= $9\frac{1}{2}$ " x $1\frac{1}{2}$ " x $1\frac{1}{2}$ "	37° to 70°	These drill grinders are sold by Edward Blake Co., West Newton 65, Mass.
No. 2FM	C=1.16" to $1\frac{1}{4}$ " L=13 $\frac{3}{4}$ "	C=6" x $1\frac{1}{4}$ " x $1\frac{1}{4}$ " G=6" x $1\frac{1}{4}$ " x $1\frac{1}{4}$ "	do	Also available in bench model, same specs.

Alden Industries**Cuyahoga Falls, Ohio****No. 200
Twist Drill
Grinder**Sharpens all straight or taper shank twist drills from $\frac{1}{8}$ " to $1\frac{1}{2}$ ". Calibrated for 59°, 90°, 130° and 140° angles. $\frac{1}{4}$ horsepower.**The Springfield Machine Tool Co.****Springfield, Ohio**

Type and Model	S=Swing (nominal) SA=Swing (actual) F=Face Plate Diameter	ST=Stroke of Grinding Head CW=Clearance Over Work Spindle CF=Clearance Over Face Plate	G=Grinding Head Stroke i.p.m.	Horsepower and Speed
Universal Vertical Grinder 1-TR	S=16"; SA=22"; F=18"	ST=14"; CW=15 $\frac{1}{4}$ " CF=13 $\frac{1}{4}$ "	G=0" to 325"	5 h.p., 3600 r.p.m.
2-TR	S=25"; SA=31"; F=25"	ST=21"; CW=22 $\frac{1}{2}$ "; CF=20"	G=0" to 245"	7 $\frac{1}{2}$ h.p., 3600 r.p.m.
3-TR	S=42"; SA=52"; F=42"	ST=27 $\frac{1}{2}$ "; CW=30 $\frac{3}{4}$ "; CF=25"	G=0" to 245" approx.	7 $\frac{1}{2}$ to 10 h.p., 3600 r.p.m.

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The Ingersoll Milling Machine Co.			Rockford, Ill.	
Type and Model	Capacity	Grinding Wheel and Spindle Travel	Saddle	Horsepower
Cutter Grinder	Cutters 4" to 30" dia.; face 7" wide; radii 2½" concave or convex	10" x ¾" x 1"; 7½"	15½" horizontal 6" vertical	¾ h.p.

O. S. Walker Co., Inc.			Worcester, Mass.	
Type and Model	Capacity	G = Grinding Wheels W = Wheel Head Adjustment WM = Wheel Head Movement	T = Table TS = Table Speed	Horsepower and Spindle Speed
	Work up to 4" high under 12" wheel	G = 8" x 5½" x ¾" W = 4"; WM = 5"	T = 12" dia. TS = To 160-200-300 r.p.m.	7½ h.p.; 1750 r.p.m.

The Thompson Grinder Co.			Springfield, Ohio	
Type and Model	Capacity L = Length of Work M = Max. Table Movement T = Transverse (Tooth Angle) D = Distance Between Centers DB = Dia. of Broach	Table W = Work Surface V = Vert. Dist. Table to Rim of Cup Wheel	Wheels Type 12 dish, 6" x ¾" x 1½"	Horsepower and Speed
Flat and Round Broach Grinders				
No. 1	L = 48"; M = 58" T = 6" x 30°	W = 9" x 72"; V = 12"	Type 11 flaring cup, 5" x 1¾" x 1½"	1½ h.p.; 5600 s.f.p.m. dish; 4700 s.f.p.m. cup.
No. 2	L = 60"; M = 70" T = 6" x 30°	W = 9" x 84"; V = 12"	do	do
No. 3	L = 72"; M = 82" T = 6" x 30°	W = 9" x 96" V = 12"	do	do
No. 4	L = 48"; M = 58" T = 12" x 30°	W = 13½" x 72"; V = 12"	do	do
No. 5	L = 60"; M = 70" T = 12" x 30°	W = 13½" x 84"; V = 12"	do	do
No. 6	L = 72"; M = 82" T = 12" x 30°	W = 13½" x 96"; V = 12"	do	do
Round Broach Grinders				
No. 1	L = 48"; M = 58" D = 52"; DB = 6"	—	Type 12 dish, 6" x ¾" x 1½", Type 1st, 3" x ¾" x ½"	1½ h.p. 5600 s.f.p.m.
No. 2	L = 60"; M = 70" D = 64"; DB = 6"	—	do	do
No. 3	L = 60"; M = 82" D = 76"; DB = 6"	—	do	do

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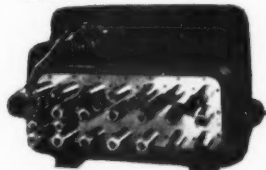
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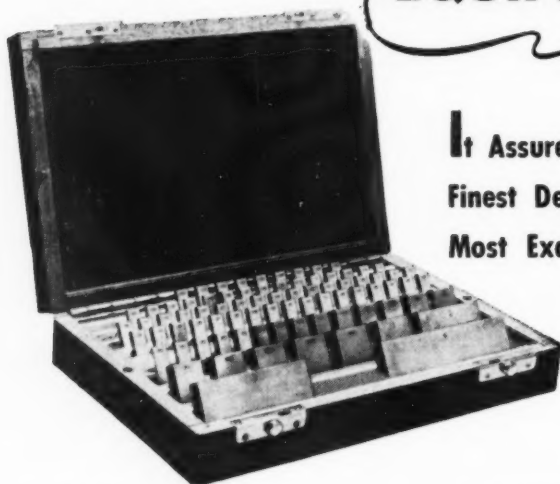
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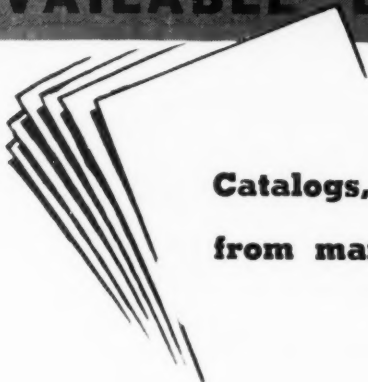
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AVAILABLE LITERATURE



Catalogs, bulletins available from manufacturers

1. **Important fundamentals** in selecting a press brake, typical applications, specifications and dimensions of Cincinnati press brakes are features reviewed in Catalog No. B-4 of The Cincinnati Shaper Co., Dept. BB, Cincinnati 25, Ohio.

2. **"Wherever There's Industry"** is a 32-page book containing 46 case studies on abrasive belt methods on machining operations in a variety of industries. Free on request from Porter-Cable Machine Co., 1262 N. Salina St., Syracuse, N.Y.

3. **An attractive general catalog**, the G-3, has recently been published by the Vaill Engineering Co., Dept. BB, 17 Brown St., Waterbury 20, Conn. It shows photos, specifications and descriptive matter on all of their standard tube forming machines. Also illustrated are typical tube end shapes which can be handled on their equipment.

4. **The Di-Profiler**—a triple action die filing tool that reciprocates, oscillates and rotates—is claimed to be adaptable for smaller surfaces, intricate shapes, cavities, deep or dead end holes and hard-to-reach working areas. Descriptive literature and price list are available from the manufacturer, Nord International Corp., P.O. Box 44-B, Den-ville, N.J.

5. **"How rotary straighteners** for pipe and tube are solving today's production problems" is the theme of Technical Bulletin No. 52 offered by Mackintosh-Hemphill Co., 9th & Bingham Sts., Dept. BB, Pittsburgh 3, Pa. The case studies reviewed cover both large and small plants, ferrous and nonferrous tubing, plus products to be straightened varying from an expensive alloy tube to standard butt weld pipe.

6. **Practical help** when the going is "tough"—is claimed for the Wohnip drill extractor in a four-page folder



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distributed by the maker, the Wohlrip Engineering Co., 589 Central Ave., Dept. BB, East Orange, N.J. Rules on how to use drill extractors serve as a handy guide for the operator.

7. "Diamonds in Industry"—a quarterly pamphlet issued by J. K. Smit & Sons, Inc., Dept. BB, Murray Hill, N.J.—serves as a medium through which news of scientific developments relative to the use of diamonds in industry is brought to men in manufacturing plants.

8. Essential data on series AA1 chucks and segments are arranged in compact and accessible form in a six-page bulletin offered by Abrasive Associates, 200 Shepard Ave., Dept. BB, Hamden, Conn. Specifications and standard applications for vertical spindle surface grinding, horizontal spindle face grinding and knife grinding are also listed.

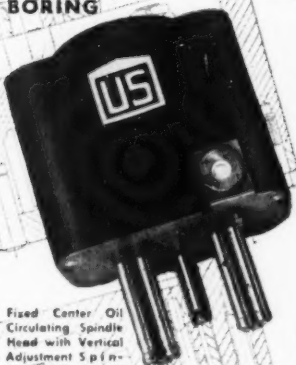
9. For convenience in determining the proper V-belt, Raybestos-Manhattan,

DRILL HEADS

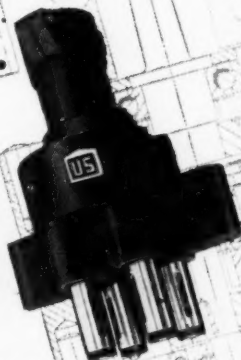
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to Fit YOUR Needs For...

DRILLING • TAPPING •
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Fixed Center Oil Circulating Spindle Head with Vertical Adjustment Spindles. Designed mainly for high speeds.

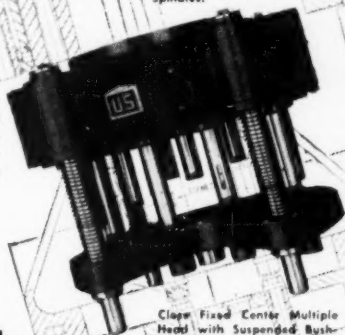


Standard Fixed Center Construction, Bushed Guide Rod Holes, and Lifter Rod Holes with Vertical Adjustment Spindles.

We manufacture, at lowest possible price, all types of multiple spindle fixed center adjustable and lead screw tapping heads.



SINCE 1915



Close Fixed Center Multiple Head with Suspended Bushing Plate.

UNITED STATES DRILL HEAD CO. • CINCINNATI 4, OHIO

Inc., Manhattan Rubber Div., Dept. BB, Passaic, N.J., is offering a fractional horsepower V-belt catalog for use in servicing light duty applications. Listings are according to the industry-standard numbering system, with the various types of machines arranged alphabetically by company or trade names.

10. How to drill, assemble and finish Carboloy cemented carbide, new grade 190, rough-cored header die nibs is ex-

plained in Manual No. D-131 offered by Carboloy Dept. of General Electric Co., 11129 E. 8-Mile Blvd., Detroit 32, Mich. This nine-page publication includes information on nib standards, heading die design, shop equipment and other data for preparing nibs and header die castings.

11. Points to be considered when applying anti-friction bearings are outlined in Bulletin No. 200-C, a catalog of self-aligning spherical roller bearings made

*your best buy in
modern milling machines:*

**GREAVES
NO.2-H**



Plain or Universal

• Offers every modern milling machine advantage:

18 spindle speeds 25 to 1250 rpm,
18 feeds $\frac{1}{2}$ " to 30" per minute, rapid
traverse, Timken bearings and
many others.

You can't buy a better combination
of simplicity, rugged construction,
ease of operation, accuracy and
production speed.

Send for bulletin and price list.

GREAVES

THE GREAVES MACHINE TOOL CO.

2600 Eastern Avenue, Cincinnati 2, Ohio

by The Torrington Co., Dept. BB, South Bend 21, Ind. Charts and tables list engineering data on life expectancy, capacity ratings, installation and service factors, lubrication and other pertinent information.

12. Dip-Pak—a hot-melt plastic coating—is said to protect vital, expensive tools, gears, and machine parts during storage and shipping, according to a bulletin issued by Fidelity Chemical Products Corp., 473 Frelinghuysen Ave., Dept. BB, Newark 5, N.J. The three types of

Dip-Pak, their physical properties, application temperatures and uses are enumerated.

13. Suitability of the Davos chuck for specific applications is covered in a four-page folder by the manufacturer, the F. E. Pini Mfg. Co., 2017 N. Halsted St., Dept. BB, Chicago 14, Ill. Operations include milling, grinding, inspection, assembly, etc., with adaptability for metal products, plastics and wood.

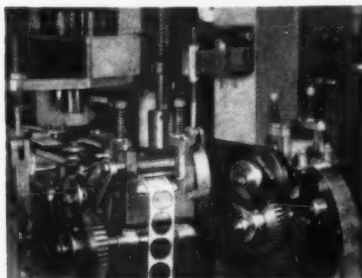
14. In the 1953 edition of reamer Catalog

HERE'S ONE SECRET OF AMERICA'S PRODUCTION

Might!

Progressive Dies Production Proved by B. Jahn! Fluid drive couplings . . . carbine magazines . . . thousands of production components are being produced in tremendous numbers . . . at reduced cost . . . in less time from B. Jahn dies. This ball bearing seal is a typical example of B. Jahn versatility and ingenuity at work eliminating assembly problems, affording new production economy —

PROBLEM: Build progressive dies combined with dial operation to produce a series of intricate ball bearing seals. Seals consisted of a formed metal ring and neoprene insert assembled into a single unit. All assemblies had to be identical, meet micro-tolerant specifications.

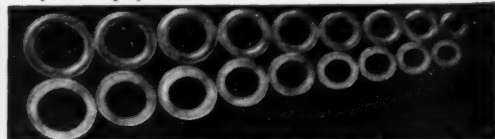


Ball bearing die during pre-test run on customer's equipment.



Die ribbon showing stations necessary to produce each seal.

SOLUTION: B. Jahn Progressive Dies PRODUCTION PROVED to turn out 50 complete units per minute! All seals were identical — all were perfect. Tools were so designed that with a 3 hour set-up time for each, 9 different sized seals could be produced in the same press equipment.



Top and bottom views of nine different seal assemblies.

Some of 50,000 ball bearing seals run for customer's actual assembly line use. Here guesswork, error, costly adjustments were eliminated — here was visual evidence that the die must work in the customer's equipment to his unqualified satisfaction before it was certified "PRODUCTION PROVED" and shipped.

YOURS—

Full details on the output-increasing applications of B. Jahn Production Proved Dies — send for this fact-filled B. Jahn brochure TODAY!



B. Jahn

THE B. JAHN MANUFACTURING CO. NEW BRITAIN, CONN.

No. 53, Lavalley & Ide, Inc., Dept. BB, Chicopee, Mass., presents specifications and illustrations of its wide range of standard reamers. An alphabetical index for quick reference and an illustrated price list are helpful features.

15. Standard service tools for industry—automotive, railroad and aircraft—also special tools for specific requirements, are listed in a 128-page catalog of the Cornwell Quality Tools Co., 1028 Cleveland Ave., Dept. BB, Mogadore, Ohio.

Wrenches, screwdrivers, drills, saws and punches, sensory torque wrenches, spring testers and reamers are among tools shown.

16. "Broaching Practice" contains usable information for the production engineer and shop man in plants concerned with metalworking. This 80-page broaching manual is published by National Broach & Machine Co., 5600 St. Jean, Dept. BB, Detroit 13, Mich.



Chicago MOUNTED Wheels

... now
even better with
79E BOND

Buy Chicago Mounted
Wheels—bonded with
79E Bond—and you'll
never use any other!

79E—a tough new bond exclusive
with Chicago Wheel—is the sensation
of the industry... it does a BETTER
grinding, burring, and finishing job
FASTER. A size and shape for every
use. Deliveries are excellent—Order
today.

CHICAGO WHEEL & Mfg. Co.

Dept. MT • 1101 West Monroe Street, Chicago 7

17. "Riveting with Hi-Shears"—a handy pocket manual—and a well-illustrated catalog are companion publications available from The Hi-Shear Rivet Tool Co., 8924 Ballanca Ave., Dept. BB, Los Angeles 45, Calif.

18. The new edition of Catalog No. 352-A has added gage protectors and snubbers, bleeders and AN vacuum control valves to its listings of needle, globe, plug, check, relief and special valves. For catalog, write to Republic Mfg. Co., 1930

West 77th St., Dept. BB, Cleveland 2, Ohio.

19. Bulletin No. 2000 graphically illustrates the complete operating cycle of loading and unloading, duplex milling and double-end center drilling which is performed simultaneously on the Motch & Merryweather three-station duplex milling and center drilling machine. This four-page circular is offered by The Motch & Merryweather Machinery Co., 715 Penton Bldg., Dept. BB, Cleveland 13, Ohio.

ARO BLOW GUN

Metered air pressure!



- Throttle valve meters air exactly...just press for more pressure ...or set for *fixed pressure*.
- Extremely simple design.
- Easy to use—fits your hand.
- One piece cast housing—sturdy, rugged construction.
- For wide range of cleaning jobs in shops, foundries, production, inspection, shipping, etc. Write for details.

The Aro Equipment Corp., Bryan, Ohio

Offices in All Principal Cities

Aro Equipment of Canada, Ltd., Toronto, Ont.

ARO BLOW GUN
 Also ... Air Tools ... Lubricating
 Equipment ... Hydraulic Equipment ...
 Aircraft Products ... Grease Fittings

20. Wespo clamp assemblies and fixture details are shown with accompanying specs in a 64-page catalog of the West Point Mfg. Co., 26935 W. 7-Mile Road, Dept. BB, Detroit 19, Mich. Full scale template sheets show 15 styles of clamps in 100 sizes and over 350 fixture components.

21. Lima dripproof induction motors are presented in Bulletin RS-2 prepared by The Lima Electric Motor Co., 260 Findlay Road, Lima, Ohio. The brochure in-

cludes speed-torque curves, frame number charts, dimensions and specifications for Lima motors from 1/3 to 150 h.p., also descriptions of variations for optional mounting and special purpose applications.

22. Twenty features of the Ex-Cell-O precision boring machines are tabulated and illustrated with sectional views and descriptive details in Bulletin No. 31205 of the Ex-Cell-O Corp., 1200 Oakman Blvd., Dept. BB, Detroit

step up production with



Stow STREAMLINER
N-40

STOW
flexible shaft
MACHINES



3-SPEED JIFFY
SJ-38

These dependable STOW FLEXIBLE SHAFT MACHINES save production time . . . speed up output . . . help lower production costs. Variable Speed Models shown are easily portable . . . cut down operator fatigue and increase on the job efficiency!

Constant Speed Models available. Also complete line of accessories designed to increase the utility of STOW Flexible Shaft Machines!

WRITE TODAY

for your free copy of CATALOG 51

STOW

Manufacturing Co., Inc.,
30 Shear St., Binghamton, N. Y.

32, Mich. Miscellaneous and unusual applications are shown and complete specifications are given.

23. **Robertson Mfg. Co.**, Dept. BB, Trenton 5, N.J., tells in a four-page bulletin: (1) what Supercast segments offer; (2) grinding facts you should know; (3) results of typical tests in operation; and (4) where Supercast segments can be used.

24. **Reasons for using pressed steel pots**—for lead, salt, cyanide, oil tempering

and metal melting—are enumerated in Bulletin No. N-1 of the Eclipse Fuel Engineering Co., 1147 Buchanan St., Dept. BB, Rockford, Ill. Technical data on sizes and dimensions and cross-section drawings of typical shapes are also featured.

25. **Fifteen styles of letters and numerals** in master type sets, technical symbols, Greek upper and lower case alphabets, circle templates and special master brass templates are all illustrated in Bulletin No. 32-T of the Green Instru-

**TEN THOUSAND
GAGES
AT YOUR FINGERTIPS**

WITH

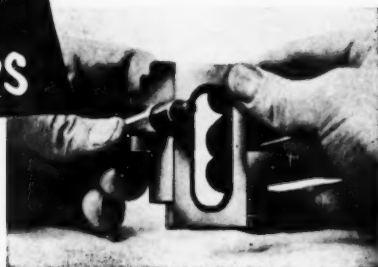
AMERICAN STANDARD

MULTI-GAGE ADJUSTABLE SNAP GAGE and HOLE GAGE

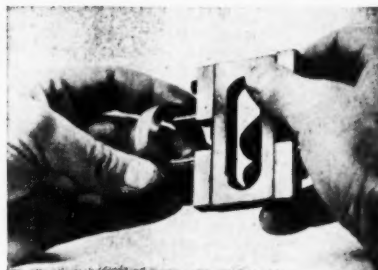
**No valuable time lost waiting for
delivery of special gages.**

- **SIMPLE TO SET WITH MICROMETER
or BLOCKS**
- **LOCKS FIRMLY IN POSITION**
- **SPLIT TENTH ACCURACY**

If your dealer cannot supply you, write to



MULTI-GAGE with snap gage jaws.



MULTI-GAGE with hole gage jaws.

AMERICAN STANDARD COMPANY

Dept. B. Plantsville, Connecticut

ment Co., 386 Putnam Ave., Dept. BB, Cambridge 39, Mass. This catalog provides a ready reference for different styles of lettering designs required in mechanical engraving.

26. Engineering and buying data on counterbores, countersinks and core drills are features of the tool catalog issued by the Modern Corp., Box BB-68, College Park Station, Detroit, Mich. A section on inserted blade cutters is also included.

27. Helpful data on "finding" diamonds are offered by Ralph Watkins International Trade, 2252 East 75th St., Dept. BB, Chicago 49, Ill., in a 64-page catalog issued by the firm. Diamond wheels and tools—all types, all sizes and bonds—are listed in the handy pocket-size manual.

28. Performance curves on Nullmatic pressure regulators are shown in Bulletin No. 4003, put out by the manufacturer, Moore Products Co., H & Lycoming Sts., Dept. BB, Philadelphia 24, Pa.

**SAVE
3
WAYS
WITH A**



CHECK THESE PRICES

Furnace Size	2000'	2300'
6x 6x12"	\$ 467.00	\$ 548.00
9x 9x18"	647.50	764.00
12x12x24"	912.00	1066.90
18x18x36"	1419.75	1629.50

Complete with 100% automatic electronic controls.

ELECTRIC FURNACE

1 SAVE with a Lucifer Electric Furnace on **FIRST COST**. Our straight line production permits economical selling price, despite use of highest quality materials throughout. Check costs on other furnaces . . . feature by feature . . . you'll save money on the Lucifer Electric Furnace **EVERY TIME**.

2 SAVE ON **MAN HOURS** with a Lucifer Electric Furnace. Less operator attention needed—Lucifer controls are **EXACT**. They reach **SPECIFIED** heat rapidly and retain **SPECIFIED** temperature without variation. No special experience required when you use a Lucifer Furnace.

3 SAVE on maintenance expense with a Lucifer Electric Furnace. Finest refractory materials are built into Lucifer Furnaces for better, more efficient heat retention. Elements are guaranteed . . . long lived . . . trouble free. You save three ways with a Lucifer Electric Furnace. More than two thousand satisfied users.

WRITE for **FREE** literature, specifications and price list of Lucifer Furnaces in wide range of sizes—top loading and side loading types. Engineering advice without obligation.

GILBERT S. SIMONSKI COMPANY

Route No. 611

Neshaminy, Pa.

Phone Hatboro 0411

Sole Manufacturers of Lucifer Electric Furnaces

Schematic drawings, specs and other technical data are given for these instruments.

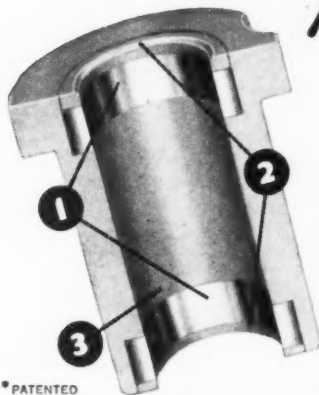
29. The new Pratt & Whitney 2E Electrolimit jig borer bulletin, Circular No. 559, may be obtained from Pratt & Whitney, Dept. BB, West Hartford 1, Conn. Sectional drawings explain in detail how the measuring system works and a composite photograph shows the operating procedure of the machine.

30. Finishing processes used in produc-

ing cold-finished carbon steel bars and their effect on mechanical properties and machinability are discussed in the eight-page bulletin "Cold-Finished Bars," published by Joseph T. Ryerson & Son, Inc., Box 8000-A, Dept. BB, Chicago 80, Ill. This booklet serves as a guide to selection, use and relative cost.

31. Cast into a convenient vest-pocket format, Glossary No. 104 is a compilation of terms used in methods, time study and wage incentives. This publi-

MORE HOLES- MORE ACCURACY- FASTER- AT LESS COST



* PATENTED

1. Tungsten carbide rings at the points of wear; 2. Steel rings protect drills and carbide; 3. Special hardened alloy steel body.

For information and prices write for Meyco Bushing Catalog No. 15



W. F. MEYERS CO., INC., BEDFORD, INDIANA

MEYCO

Carbide Inserted Bushings
Are Doing It Daily!

HOW? Like this: (1) Last longer... with a life—in most cases—as long as solid carbide bushings at prices that come close to the prices of ordinary steel bushings; (2) Increased life for your drill jigs and fixtures; (3) Increased life for your drills and reamers; (4) Accuracy maintained for a LONG PERIOD of time; (5) Less non-productive machine time, less lost man-hours, because bushings need not be changed as often; (6) Inspection time saved, because of greater accuracy for a longer time; and (7) Less waste due to spoilage, for the same reason. Don't pass up a good bet! Get the dope on MEYCO Carbide Inserted Drill Jig Bushings today!

cation, issued by the Society for Advancement of Management, 411 Fifth Ave., Dept. BB, New York 16, N.Y., is priced at \$1.00.

32. Controlled indexing by a twist of the wrist with the Koebel Type K Handexer is claimed by the Koebel Diamond Tool Co., 9456 Grinnell Ave., Dept. BB, Detroit 13, Mich., in its four-page pamphlet, Form 353. This hand-operated diamond tool is suggested as an indexing device for the cylindrical grinder.

33. "Bar Bending Machines." Bulletin No. 100-F, describes Stamets machines for automatic bending of metal bar stock $\frac{3}{8}$ " to 1" in diameter. The pamphlet details sequence of operations and construction of the machines. Write Wm. K. Stamets Co., Dept. BB, Jenkins Arcade Bldg., Pittsburgh 22, Pa.

34. The versatility of the Clearing horn-ing presses is emphasized in Booklet No. 223 available from the Clearing Machine Corp., 6492 West 65th St., Dept.

LEVIN[®]
MICRO-DRILL
PRESS

for holes
as small as .002"



Write for Bulletin H describing the Micro-Drill Press and listing collet sizes. Louis Levin & Son, Inc., 782 E. Pico Blvd., Los Angeles 21, California.

Designed to hold small drills in precision collets. Absence of a sliding quill guarantees extreme sensitivity with finger-tip control. A mounted $\frac{1}{8}$ " capacity drill chuck can also be used.

BB, Chicago 38, Ill. Design and construction details of both the smaller size and heavier presses are included, as well as cutaway drawings of engineering details.

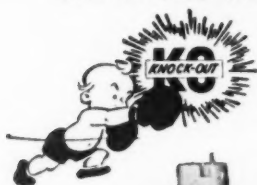
35. Neeco metalcutting guides, in styles to fit hand torches from 70° to 90°, are covered in Bulletin No. 101 of the New Era Engineering Co., Dept. B-97, 458 West 29th St., Chicago 16, Ill. The three principal types are: small circle guide for cutting circles 1" to 15" dia.;

large guide for circles 10" to 66" dia.; and a straight-line guide.

36. Bulletin No. 38 of the Meehanite Metal Corp., 715 North Ave., Dept. BB, New Rochelle, N.Y., is devoted to the use of Meehanite castings for component parts by major machine tool manufacturers. Numerous illustrations show the finished machine tool and indicate the specific Meehanite castings used in manufacture.

There's a reason 76%*

of all popularly-priced Tool and Cutter Grinders
sold in 1952 were "Knock-Outs"

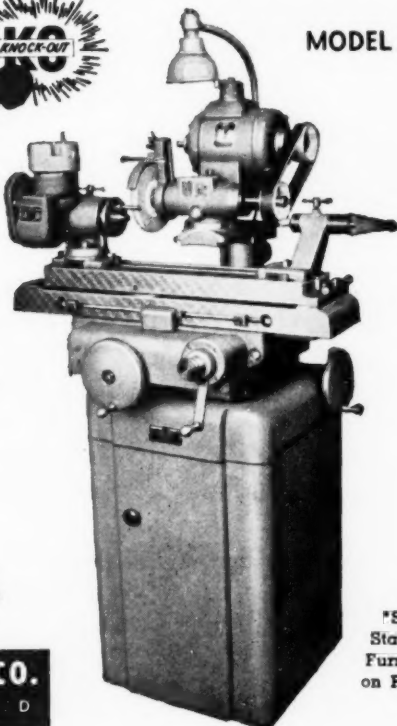


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Will do
anything that
machines
costing 2 or 3
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will do . . .
yes and in
less time.

Distributed
Only Through
Franchise
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K. O. LEE CO.
ABERDEEN, S. D.



*Sales
Statistics
Furnished
on Request

37. Haskins line of rotary files, high speed steel ground cutters and carbide tools are catalogued in Bulletin No. 57 of the R. G. Haskins Co., 2647 West Harrison St., Dept. BB, Chicago 12, Ill.

38. Domestic and European machine tools, a comprehensive showing of accessories for turret lathes, also a large listing of used and rebuilt machine tools, are contained in the 180-page Catalog No. 270 of Morey Machinery Co., Inc., 410 Broome St., Dept. BB,

New York 13, N.Y. Suggestions are given for solving machine tool, installation and maintenance problems.

39. Features of the Mico portable pantograph engraver—for two and three-dimensional engraving and precision duplicating—are summarized in Catalog No. 53 by the manufacturer, the Mico Instrument Co., 78 Trowbridge St., Cambridge 38, Mass. Component and accessory parts, also various styles of master type, are listed in the booklet.



*Slashes Costs On
Reaming Jobs*

Staples CARBIDE-TIPPED SHELL TYPE EXPANSION REAMER*

Here's how you can triple your tool life on all types of line and piloted reaming jobs—use Staples Shell Type Expansion Reamers. To compensate for wear, reamer shell expands to original diameter by driving it up the tapered arbor. Re-expand shell until maximum carbide utility is reached. A new tool is obtained simply by replacing the worn shell—a standard item. Many design variations of this tool are possible, including use of two shells of different diameters for step reaming.

For maximum tool economy, specify Staples Carbide-Tipped Circular Tools for reaming, core drilling, spotfacing, counterboring, and end milling jobs. Quick delivery of standard tools from stock. Special tools designed to your requirements. Write for tool catalog.

* Patented

THE STAPLES TOOL COMPANY, Cincinnati 25, Ohio

Distributors in Major Cities

Staples CARBIDE-TIPPED CUTTING TOOLS

A complete line of Circular Carbide-Tipped Cutting Tools
Expansion Reamers — Special Tools

40. Many "how-to-do-it" suggestions are incorporated in Catalog No. 18 of the Adjustable Clamp Co., 417 N. Ashland Ave., Dept. BB, Chicago 22, Ill. Both the "Jorgensen" and "Pony" lines of clamps and handscrews are illustrated by the firm on the occasion of its 50th year of clamp manufacturing.

41. Whitman & Barnes, Dept. BB, Plymouth, Mich., is releasing a four-page folder covering its line of regular

spiral drills for the softer materials and "fast-lead" masonry drills for tougher jobs. Information is given on how to use the drills to best advantage, as well as sharpening instructions.

42. Loads, speeds, mounting, lubrication, tolerances, gaging and handling of instrument bearings are discussed in Catalog No. 53 recently published by New Hampshire Ball Bearings, Inc., Dept. BB, Peterborough, N.H. The spiral-bound catalog contains 28 pages

SIGOURNEY

M-100

THE PRECISION BENCH DRILLING MACHINE

ACCURATE because table and column exactly squared one to the other.

LONG LIFE because of hardened and ground spindles.

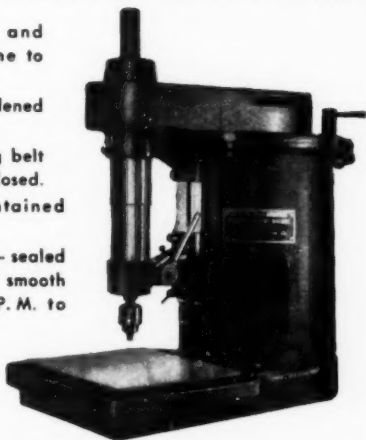
SAFE because motor, driving belt and spindles are entirely enclosed.

STRONG, RIGID for maintained accuracy.

SMOOTH AT HIGH SPEEDS — sealed ball bearings throughout for smooth operation from 4000 R. P. M. to 10,000 R. P. M.

MODELS — with 1, 2, 3 and 4 spindles.

Send for illustrated bulletin.



THE SIGOURNEY TOOL CO.

Hartford 6, Conn.

Sole Sales Agent

PRATT & WHITNEY

Division Niles - Bement - Pond Co.

West Hartford, Connecticut

1952

of dimensional and design data on 137 Micro ball bearings, in bore sizes .025" to 5/16", o.d. .100" to 1/2".

43. An analysis table of the more important types of Allegheny metal available in wire form, physical properties chart, weights and measures, decimal equivalents, listings of principal uses and other applications are all included in the 20-page booklet of technical data on stainless wire available from Allegheny Ludlum Steel Corp., Dept. BB, 2020 Oliver Bldg., Pittsburgh 22, Pa.

44. Features of the Niagara electrically controlled air sleeve clutch are discussed in detail in Bulletin 65-B of the Niagara Machine & Tool Works, 637-697 Northland Ave., Dept. BB, Buffalo 11, N.Y. Technical data, operation and construction details supplement illustrations of gap frame double crank presses—inclinable series "BI" and non-inclinable series "B."

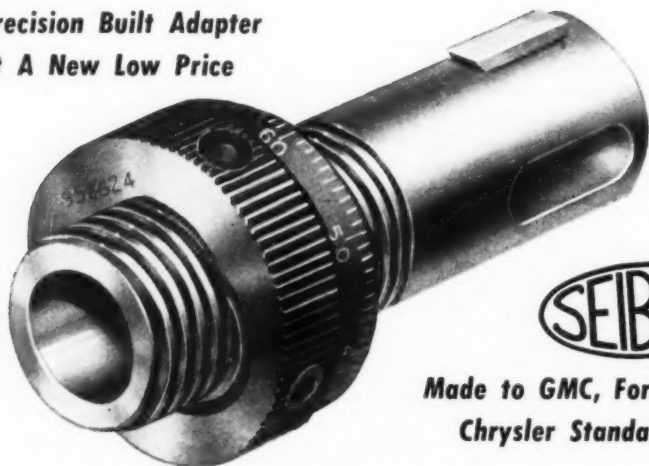
45. Items in Allen-Bradley's line of standard motor control apparatus are

SEIBERT

Makers of

SHUR-LOCK ADJUSTABLE ADAPTERS PRESENTS

**A Precision Built Adapter
At A New Low Price**



**Made to GMC, Ford and
Chrysler Standards**

Concentricity	— Max. .002 at end 6" Test Bar
Threads	— Precision Ground (Acme)
Finish	— 6 to 8 Micro
Micro Nut	— Positive Lock Any Position
Woodruff Key	— Relieved Against Swelling
Stock	— All sizes $\frac{1}{2}$ - $1\frac{1}{8}$

SEIBERT & SONS, INC. CHENOA, ILL.

outlined in a 28-page bulletin entitled "Quality Line of Motor Controls for All Industries." Write the Allen-Bradley Co., Dept. BB, Milwaukee 4, Wis.

46. How the Van Norman No. 26 and 36 ram type millers are engineered for all-purpose milling and to give the work range of several millers is described in an attractive eight-page bulletin of the Van Norman Co., Dept. BB, Springfield 7, Mass.

47. Collets, feeders and pads for auto-

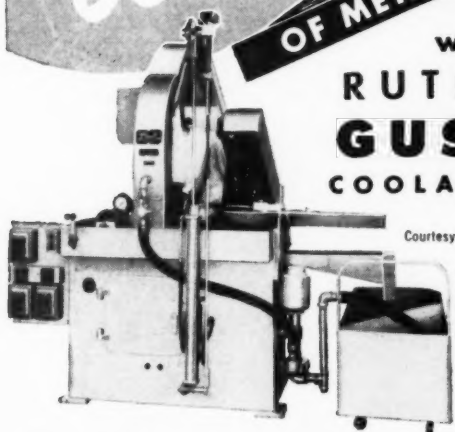
omatics, hand machines, turret lathes, milling machines, production and engine lathes are listed in Catalog No. 18 of the Sutton Tool Co., Dept. MTB-5, Sturgis, Mich.

48. Publication No. M-1760 of the Cincinnati Milling Machine Co., Dept. BB, Cincinnati 9, Ohio, gives dimensional drawings and specifications of three types of the Cincinnati No. 2-24 automatic milling machines: (1) plain, with automatic cycles for table only; (2) plain rise and fall, with automatic cycles

CUT COSTS

OF METAL CUTTING

with a
**RUTHMAN
GUSHER
COOLANT PUMP**



Courtesy American Chain & Cable Co.

Illustrated is a Campbell 406 Wet Abrasive Cutting Machine equipped with a Ruthman Gusher Coolant Pump.

Costs are down when you use a Gusher, for Gusher Coolant Pumps assure you efficient operation and long trouble-free life.

You get instantaneous coolant flow, as much or as little as you need. The heavy duty pre-lubricated ball bearings, dynamically balanced rotating shaft with no metal-to-metal contact within the impeller housing gives you a long trouble-free life for your gusher. Write us today.

THE RUTHMAN MACHINERY CO.

1816 READING ROAD

CINCINNATI, OHIO



for both table and spindle carrier; and (3) duplex, with automatic cycles for table only.

49. Exploded views and parts listings applying to older design lathes are included in Manual S-104 of the Cincinnati Lathe & Tool Co., Dept. BB, Oakley, Cincinnati 9, Ohio. Installation, operation, lubrication, etc., of the improved Model LT Cintilathes are main problems of the manual.

50. Hi-Temp Oil 303—for use at tem-

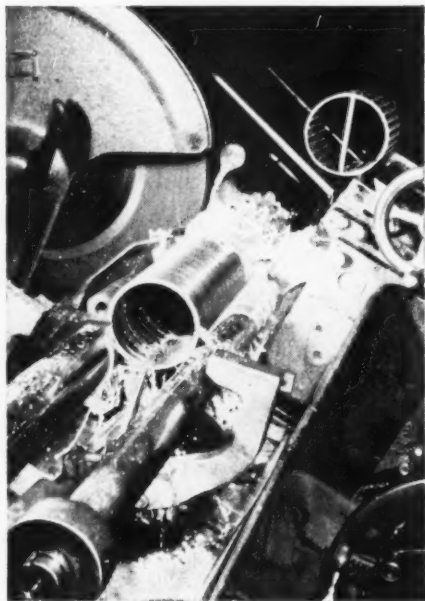
peratures of 500° and over—has been developed by the E. F. Houghton & Co., 303 W. Lehigh Ave., Dept. BB, Philadelphia 33, Pa. Information on this product and other Houghton lubricants is contained in the recently revised "Hi-Temp Oils" leaflet.

51. For a copy of Bulletin 5302—covering the South Bend 16-inch 12-speed lathe—write to South Bend Lathe Works, Dept. BB, 425 E. Madison St., South Bend 22, Ind. A pushbutton control system for speed changes makes

Surest way to profitable CENTERLESS GRINDING

● To get the finish and production you want—at the lowest possible cost—start with a letter or phone call to your CARBORUNDUM distributor or salesman. Without obligation to you, he'll visit your plant and study every angle of your centerless grinding or lapping operation. Then, based on his wide experience in this field, he'll recommend the exact combination of CARBORUNDUM's grinding wheels and regulating wheels to meet your particular needs.

CARBORUNDUM offers a complete selection of proven grains and bonds for all types of centerless grinding. And CARBORUNDUM's regulating, or feed wheels are the standard of the industry—as they have been since this method of grinding was invented.



CALL YOUR CARBORUNDUM SALESMAN OR DISTRIBUTOR TODAY! Or write to
The Carborundum Company, Dept. BB 81-314, Niagara Falls, N. Y.

CARBORUNDUM

REGISTERED TRADE MARK

the **ONLY** source for **EVERY** abrasive product you need

this lathe a fast producer on precision work.

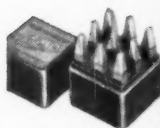
52. Bulletin No. 870-C-52 showing the Michigan model 870-C internal gear finisher for spur and helical gears to 12" o.d. is available from Michigan Tool Co., 7171 E. McNichols Rd., Dept. BB, Detroit 12, Mich. Design features that permit the machine to perform either transverse or plunge shaving are described.

53. Wales Catalog N offers the complete line of Wales independent, self-contained notching units that notch mild steel up to 1/4" thick. Illustrations, line drawings and specifications of this tooling unit are contained in the colorful catalog put out by Wales-Strippit Corp., 396 Payne Ave., Dept. BB, North Tonawanda, N.Y.

54. Threading tools by Murchey Division of the Sheffield Corp., Dept. BB, Dayton 1, Ohio, are presented in Catalog MU-153. In addition to standard tools,

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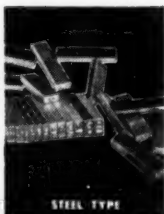
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the Murchey engineering staff maintains a service for developing combination tools combining reaming, boring, chamfering, etc., with threading operations.

55. Construction features of the clutch equilibrators on its Multi-Max line of punch presses are explained in the eight-page catalog available from the Diamond Machine Tool Co., 5111

Coffman-Pico Rd., Dept. BB, Pico, Calif.

56. American Coldset Corp., Dept. BB, 87-89 Court St., Paterson 3, N.J., manufacturer of diamond tools, recently published its newest bulletin giving prices, descriptions and features of the single point Coldset diamond tools which are claimed to be superior to those tools with diamonds set by other methods than the cold setting process.

New Technical Books

Materials Handling

By John R. Immer, professor of industrial management, assistant director of the division of business studies, The American University. Published by the McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y. Price \$8.00; 591 pages.

With the dual purpose of supplying a comprehensive text and a practical guide, this book not only describes specific methods of handling, but also illuminates the underlying characteristics common to many handling problems. It

further offers an excellent survey of materials handling equipment from a new functional approach, simplifying application of equipment types for solving the engineer's immediate problems. It consists substantially of case histories; underlying principles of each are clearly delineated and fundamental issues are defined. Motion and time study are considered a part of handling and latest techniques are given application. Chapters on operator training and instruction, maintenance and safety are included. Finally, there is a wealth of teaching aids including bibliographies and a list of films.

Simple Blueprint Reading

Published by The Lincoln Electric Co., Cleveland 17, Ohio. 207 pages. Price, \$1.00.

This volume simply and clearly gives the rudiments of blue print reading without too much detail. It should help the novice as well as the experienced machinist who needs to brush up on reading and on his symbols. It is obvious that no matter how good an operator may be he will be much better

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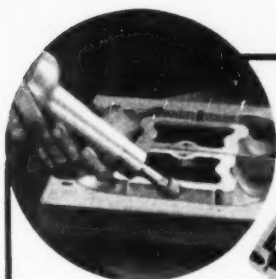
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if he can read blueprints, for he will be able to read from the print just what is to be built and see the part as it will be. Also, he has a record or instruction sheet to which he can refer from time to time as the job progresses without having to ask the supervisor too many questions.

In the manufacturing world the man with better mental and physical training is soon marked by his employer as a valuable worker. This book, dili-

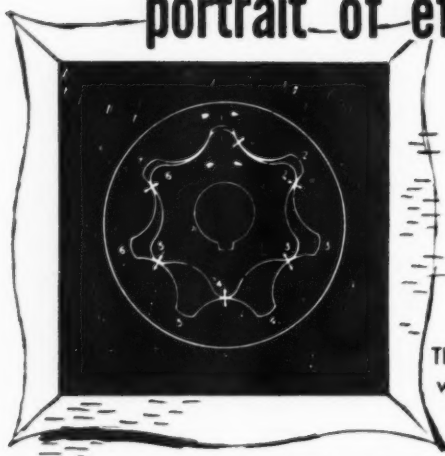
gently studied, will likely make him a better workman.

Jewelry making

By D. Kenneth Winebrenner, Professor of Art, State University of New York, instructor in jewelry and metalwork, Department of Fine and Industrial Arts, Teachers College, Columbia University. Published by Laurel Publishers, Scranton, Pa. 181 pages, price \$6.50.

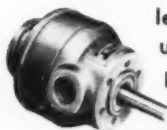
Throughout this outstanding volume the emphasis is on the creative instead of the rigid directions and projects com-

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GEROTOR hydraulic pumps

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mon to many other books; on contemporary design rather than on imitative designs inspired almost entirely by nature; on the joy of free execution rather than on mere technical proficiency alone.

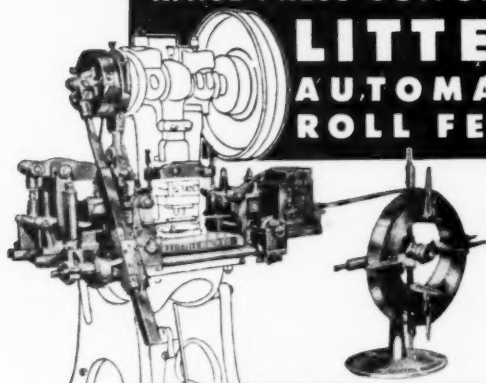
There are 24 suggested approaches to design—from scribbling and doodling to modeling in papier-maché. There is a great variety of tools to choose from, but the emphasis is on the simple and inexpensive.

The illustrated dictionary of tools, the list of things to make, the dictionary of processes, all are arranged in alphabetical order for easy reference. The novice will get the feel of material through shaping, sawing and soldering metal, while the professional will find many new areas in design and approach that are the latest trends.

There's a chapter on where to buy supplies; a classified index broken down into design suggestions, supplies and

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ASME Screw Thread Manual

By George T. Trundle, Jr., Chairman, board of directors, The Trundle Eng. Co.; published by the American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N.Y.

A most important and necessary handbook, recently published by the American Society of Mechanical Engineers, is the culmination of 50 years of argument, conference and compromise. This book will be handy for every draftsman and engineer who, in any manner, deals with threaded screw parts.

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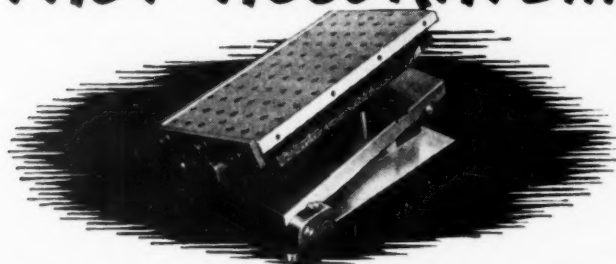
their gages. The volume contains the American standards and those that were set by the accord of 1948 signed by Canada, Great Britain and the United States. The agreement was designed to assure the interchangeability of screws and threaded products of those nations.

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bickering. When, after all the years, the smoke of argument, theorizing and experimenting settled, the arsenal of democracy was strengthened immeasurably.

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sions Co.; Stanley G. Flagg of S. G. Flagg & Co.; Col. E. C. Peck, general superintendent of the Cleveland Twist Drill Co.; Edwin M. Herr, president of Westinghouse Electric & Mfg. Co.; Charles M. Manley of Manley & Veal; Frank O. Wells, president of Wells Corp.

Hydraulics as Applied to the Machine Tool Industry

Paper bound; 52 lessons; available through Product Service Dept., Vickers, Inc., 1400 Oakman Blvd., Detroit 32, Mich. Price \$2.00.

This is one of a series of textbooks

prepared by instructors in Ford schools for the instruction of hydraulics. The manual contains information about hydraulic pumps and valves and their maintenance and repair; also the practical application of hydraulics to machines for the control of speeds and feeds.

Mechanical Inspection

By W. H. Armstrong, associate professor of industrial engineering, School of Engineering, The Pennsylvania State College; published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y.; 361 pages. Price \$5.50.

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A practical manual with simplicity of presentation as a strong recommendation. This book can help train inexperienced men and women as inspectors in machine shops or other related industries. Designed primarily for use in class work of technical institutes, vocational industrial schools, or industrial training programs, it is also sufficiently detailed for self instruction.

The major emphasis is upon descriptions of tools which are used for di-

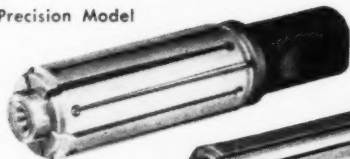
mensional inspection of machine shop products, and explanations of methods used by inspectors. Outside of this general plan of organization, there are treatments of hardness testing, magnaflex and radiographic inspection and statistical quality control.

The Norton Story

By Mildred McClary Tymeson. Published by the Norton Co., Worcester 6, Mass.; Distributor, Commonwealth Press, 44 Portland St., Worcester 8, Mass.; 132 pages, profusely illustrated; Price \$3.75.

CHAMPION E-X-P-A-N-D-I-N-G MANDRELS

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determine the national characteristics of an American city. Very interesting reading.

Synchros Self-Synchronous Devices and Electrical Servo-Mechanisms

By Leonard R. Crow, educational specialist in design and development, and director of research and development. Universal Scientific Co. Published by The Scientific Book Publishing Co., Vincennes, Ind. 222 pages; price, \$4.20.

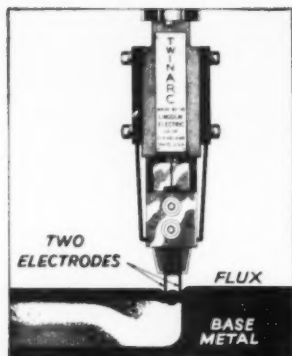


Fig. 1. New Lincoln "TWINARC" feeds two continuous electrodes simultaneously for faster welding.

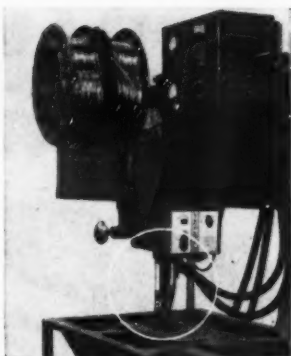


Fig. 2. Automatic Lincolnweld LAF-2 with new "TWINARC" attachment. "TWINARC" replaces original single electrode jaws. Operates with same single controls.

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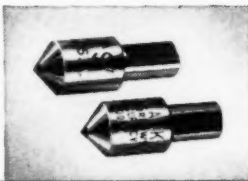
By James F. Lincoln. Published by The Lincoln Electric Co.; 288 pages, cloth bound. Price \$1.00.

If one works for a living in business or industry either as a factory worker

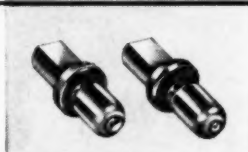
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that skill and the results it produces in higher pay, greater output and lower costs. How we can put this incentive into our business life as we do in other phases of our life, and how everyone will benefit thereby is the problem and thesis to which Mr. Lincoln has addressed himself.

Elasticity in Engineering

By Ernest E. Sechler, Professor of Aeronautics, California Institute of Technology. Published by John Wiley & Sons, Inc., 44 Fourth Ave., New York 16, N.Y. 419 pages, 234 illustrations. Price \$8.50.



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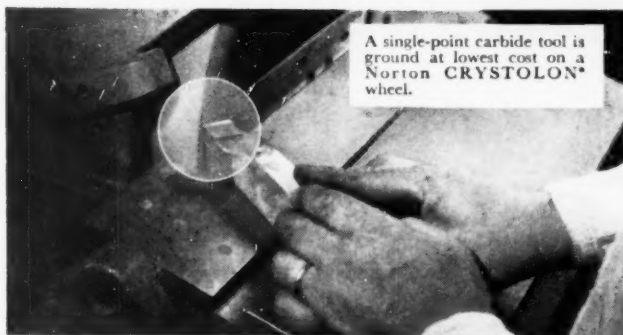
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lems of stable (non-buckling) structures and the third section treats instability (buckling) problems. The last two sections discuss approximate methods of solving problems too complex for formal proof.

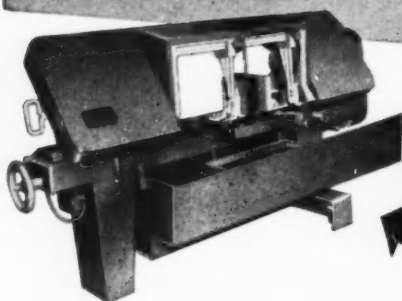
Metal Finishing

Published by *Finishing Publications, Inc.* 381 Broadway, Westwood, N.J.; 556 pages. Price \$3.00.

This 21st annual guidebook directory devoted to metallic surface treatments

has included in its contents such subjects as: Plant Engineering; Mechanical Surface Preparation; Chemical Surface Preparation; Plating solutions and Operating Data; Special Plating Procedures; Control, Analysis, Testing; Tables and Data Sheets; Directory of Suppliers, Manufacturers, Products and Trade Names; Metal Finishing Consultants; Schools Teaching Electroplating; Engineering Societies in the Engineering Field; Selected List of Reference Books.

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**List of Books and Periodicals
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Diamond Information Bureau**

From Industrial Diamond Information Bureau, 32-34 Holborn Viaduct, London, E.C.1; 214 pages. Paper binding. Over 4,000 titles. Free distribution.

The Industrial Diamond Information Bureau, 32-34 Holborn Viaduct, London, E.C.1, established in 1943, has collected from its initiation a large amount of publications falling into the fields of diamond occurrence and mining, dia-

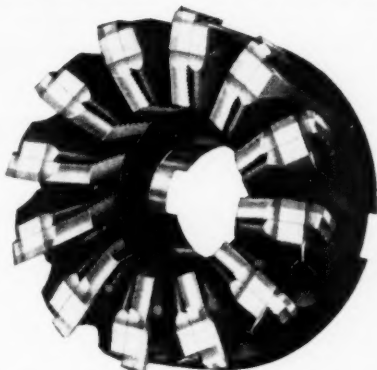
mond tools, diamond polishing, gemstones, crystallography and all related mechanical, physical and technological sciences. It was felt that this library could be more usefully employed if a classified list of these publications were available.

In two appendices in numerical order, reports of investigations and information circulars of the U.S. Bureau of Mines are listed, and government reports on foreign industries published after the war.

APEX INSERTED-BLADE METAL-CUTTING TOOLS

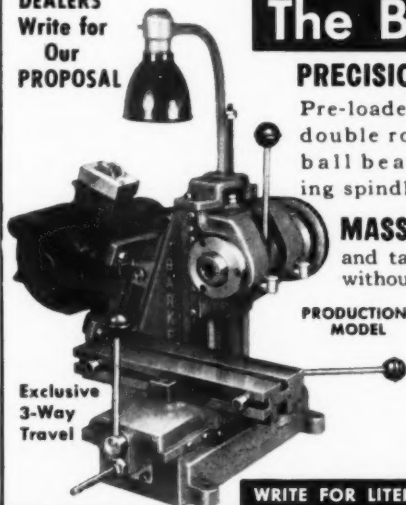
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Body can rotate either right or left hand. Consequently, selecting blades with tips of proper material mounted at proper angles produces a cutter that meets any requirement. Write for Bulletin 531.



MCCROSKY Jack-Lock[®] MILLING CUTTERS

Complete line, fitted with high speed steel, cast alloy or carbide tipped blades. Sizes from 3" to 24" to meet any requirement. Write for Bul. 17-M.



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Chucking reamers with straight or tapered shanks, also shell reamers with tapered holes or large straight holes. Standard sizes from 1/5 16" to 6" in diameter. Write for Bulletin 18-R today.



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These tool posts permit tools to be swung into position quickly, indexed accurately, and locked rigidly. Four styles—11 sizes. Write for Bul. 18-T.



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Individually ground, tapered V-key centers the block and cutting blades accurately and rigidly yet permits easy release for regrinding. Write for Bul. 18-B.



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MCCROSKY "Specials" combine two or more boring, facing, chamfering or reaming operations into a single tool, cutting set-up time and costs. Write for Bulletin 17-S today.



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Engineering and Sales Representatives in the Principal Cities

Shop HINTS



Mechanical Handling for Heavy Chucks

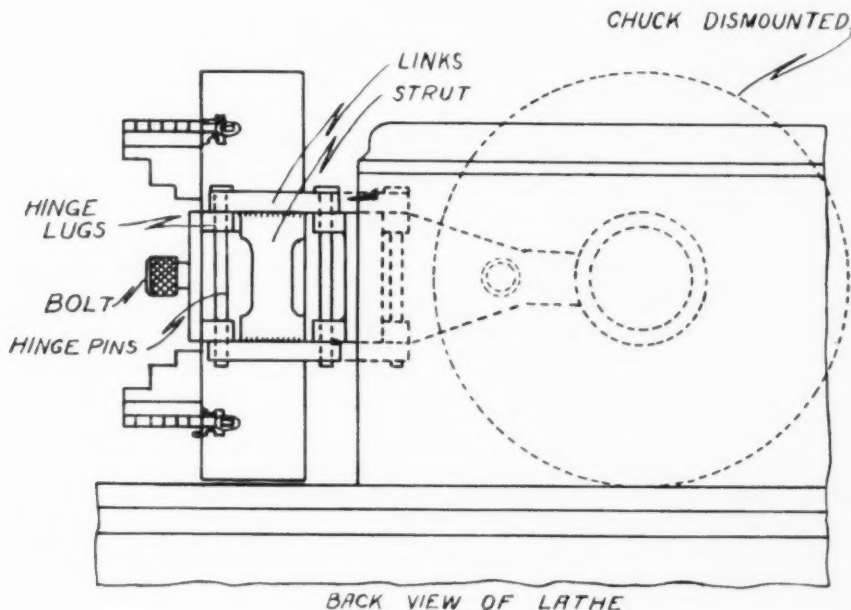
By Tom Brown

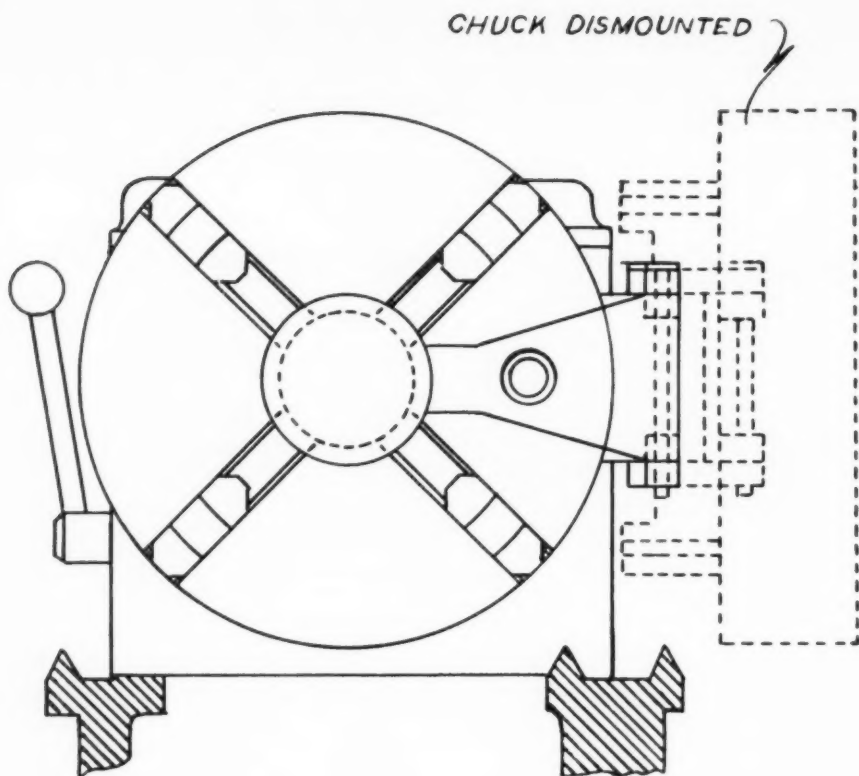
Consulting Engineer

HEAVY CHUCKS on large lathes are a major handling problem when it is desired to take them off the lathe spindle in order to do center work. It is generally a two-man job to get them off the spindle nose and onto the floor. Damage to the machine often results from this, and the possibility of accident to those wrestling with the chuck

is always present. Some chucks are too heavy, even for two men, and must be handled by means of a crane. This takes up a lot of time which might otherwise have been spent on productive work.

The productive power of large engine lathes is increased greatly if means are provided for mounting and





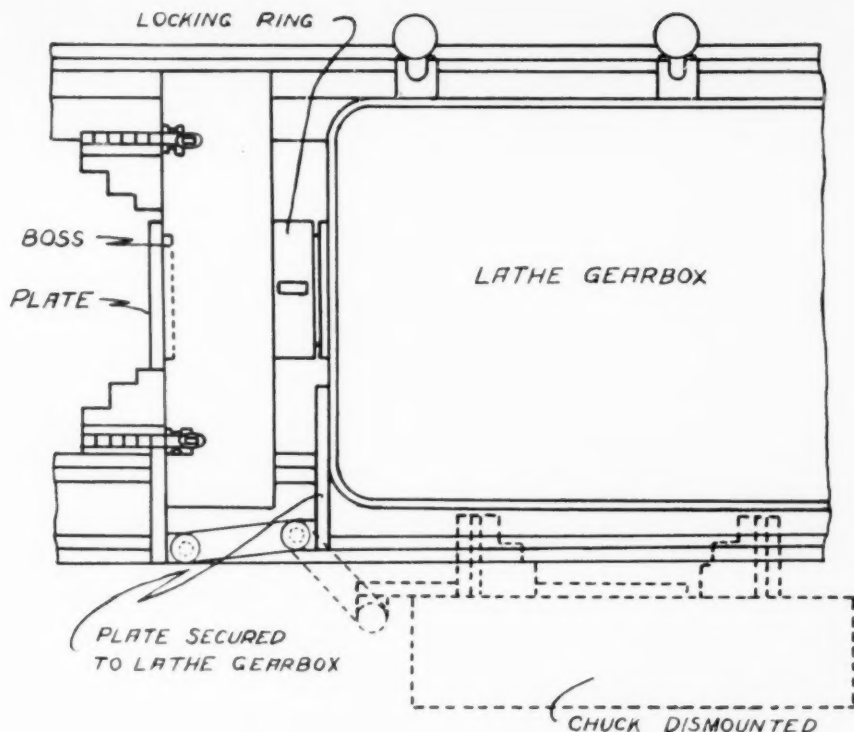
VIEW ON END OF LATHE SPINDLE

dismounting their chucks quickly and with a minimum of effort. An arrangement which we have fitted to a 16" lathe so that the operator can mount or dismount the chuck in two or three minutes is illustrated in the sketch.

The arrangement comprises a heavily constructed articulated hinge, one end of which is bolted to the face of the lathe headstock gear box, the other end carrying a plate which may be clamped to the face of the chuck. The chuck may be eased off the spindle nose and swung on the hinge, until it takes up a position out of the way at the back of the gearbox. In this way,

the chuck is not raised or lowered but moves on the horizontal plane only and therefore can be unshipped from the spindle with one hand.

The lathe spindle nose has the standard American taper and key mounting for the chuck and is released by unscrewing the locking ring by means of a large C-spanner. Prior to releasing the locking ring, the plate is attached to the chuck. The plate has a projecting boss integral with it for engaging with the hole in the center of the chuck body and a substantial headed bolt which passes through the plate and engages with a tapped hole in the chuck



TOP VIEW OF LATHE

body face. This bolt can be designed to engage with slots in the chuck body if any are provided. This bolt clamps the plate firmly to the chuck body, the boss on the plate taking most of the weight.

When the locking ring has been released, the chuck can be pushed around the back of the lathe on the hinge joints of the chuck handler, suspended on the plate. Hinges on the plate and the anchoring plate securing the handler to the lathe gearbox are formed by steel lugs which are welded to both.

The connecting link between the two plates comprises a weldment formed of two heavy steel links which are united together to form one unit by means of the flat strut between them. The hinge pins are hardened and ground and are merely dropped vertically into the hinge pin holes.

This handler has increased the productivity of our heavy lathe considerably. The operator now has no hesitation in changing from chuck to center work whenever necessary and the diversity of the lathe is utilized fully.

Personal tool list lowers thefts By Harold D. Rhodonbaugh

The value in dollars and cents of small tools stolen annually from Ameri-

can industry will always remain an unknown factor, but it is known to be high. The personal tool card, listing all tools owned by the average tool-

EMPLOYEE PERSONAL TOOL LIST & PERMIT FOR CO. REP. TO CHECK TOOL BOX AT ANY TIME FOR CO. TOOLS CLOCK NO.

NAME-	TOOL CHECK NO.	DEPT.	DATE:	BOX DESCRIPTION	EST. VALUE-
HAND TOOLS	NO.	DESCRIPTION		PREC. TOOLS	NO. DESCRIPTION
Arbors				Blocks	
Bits-TCT-New				Caliper Inside	
" -TCT-Used				" Outside	
" -HSS-New				" Vernier	
" -HSS-Used				Divider	
Bars-boring				Edge-Straight	
Chisels				Center Gage	
Clamps "C"				Gage-Drill	
" Hold Down				" Depth	
" Parallel				" Feeler	
Drills-center				" Hole Small	
" -std.				" Planer	
Dies				" Radius	
" thd.				" Surface	
Drifts				" Telescope	
Files				" Thread	
Grips-vise				" Wire	
Hammers				Indicator	
Hones				Magnifine(Glass)	
Key chuck				Jeweler Glass	
Knife Burr				Mike Outside	
Mills				" Inside	
Wipers				" Depth	
Pliers				" Thd.	
Punches				Parallel-Plain	
Reamer				" Adj.	
Saws				" Magnetic	
Scrapers				Protractor-Plain	
Scribes				" Bevel	
Taps				" Vernier	
Vise				Rule-Tape	
Wrenches-Allen				Scale	
" Box				Scale Clamps	
" Crescent				Tramonsels	
" Die				Vise-Pin	
" End				Wiggler	
" Monkey				Squares	
" Socket				Sine Bars	
" Tap				Ankle Plate	
" Pipe				toolmakers buttons	
Screwdriver				Mirror	
Jack-Screws				Drafting Set	
Pen Light				Safety Goggles	
CHECKED BY:	REMARKS				

FORM M-68

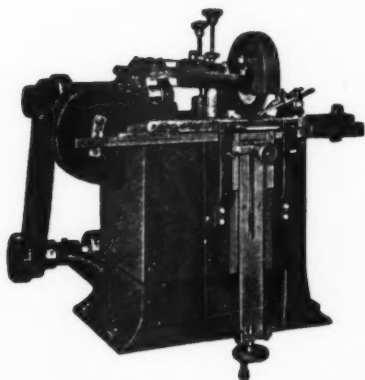
maker, helped us solve disputed ownership, minimized time required to check in and check out tool boxes and lowered thefts.

The system, once established, functions smoothly, quickly and efficiently. The employee's tool box is checked and his personal tools listed at the time he is employed. He is advised and held responsible for advising the tool crib

personnel of personal tool purchases to be added to his tool card. The company may request a tool pass into the plant through the guard, who dispatches a duplicate of the pass to the tool crib. In conjunction with this pass, a decree may be issued stating that any tool, new, used or handmade, must be accompanied by a guard pass or otherwise the tool will be questioned.

Here's the sharpener that triples your saw mileage

E C Automatic Combination Hack—Band—Circular Saw Grinder



An exclusive feature enables one grinding wheel to sharpen and shape a variety of teeth without changing shape of wheel.

This grinder sharpens and reclaims hack saws that would otherwise be discarded. Instead of one or two sharpenings per saw, you get up to five and six, literally tripling saw usefulness. Write for details.

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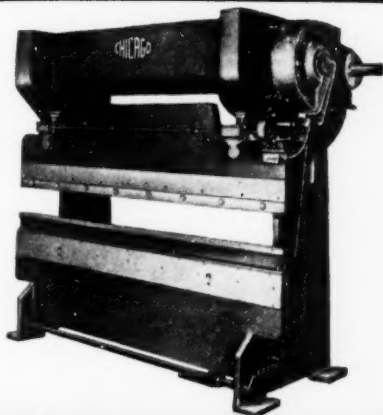


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How many feet in that roll?

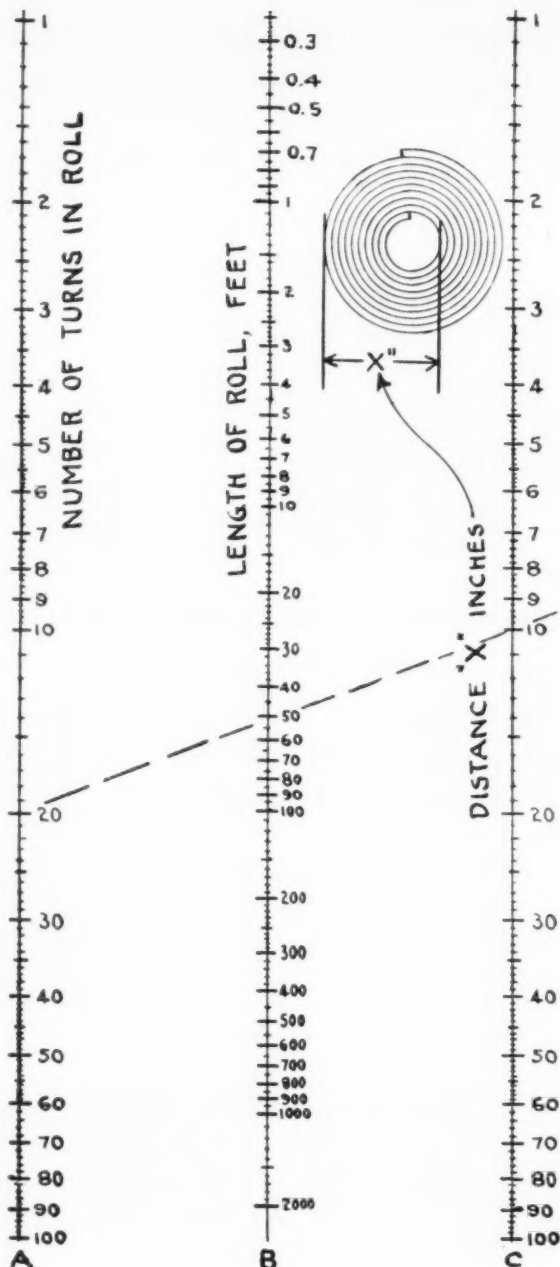
By W. F. Schaphorst, M.E.

Use this simple chart when you want to know the number of feet of material in any roll—belting, paper, insulation, wire netting, cloth, rugs, carpets, sheet metal, etc.

The sketch shows how to measure the roll. The distance "X" must be measured in inches, exactly as shown. Only one measurement is necessary because this chart is based on a simpler formula than the one that is usually given in books and elsewhere. For example: How many feet of material in a roll which has 20 turns, the distance "X" being 10 in.?

The dotted line drawn across the chart shows how easily the length is found. It is a little over 52 feet. Simply connect the 20 in column A with the 10 in column C and the answer is found in column B.

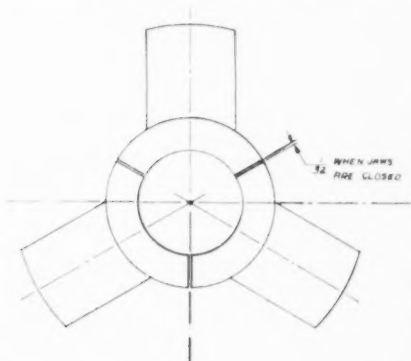
It will be noted that the range of the chart is great enough to cover easily any ordinary roll. You needn't actually "draw a line" as was done here. Just lay a straightedge across from known point to known point and the intersection with the middle column gives the length of the roll immediately. A little practice will soon make you expert in the application of this chart to actual problems.



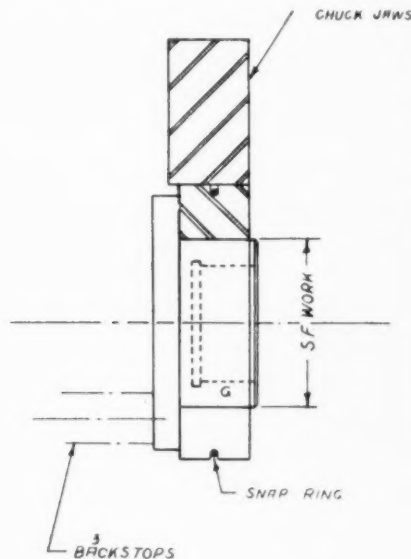
Split ring aids internal grinding

By Roger Isetts

During internal grinding of flanged bushings and similar parts such as the one shown that require concentricity with the o.d., the parts cannot usually be chucked directly because of the limited jaw movement of most air oper-



ated chucks. The illustrated setup solves this problem, yet is inexpensive



June, 1953

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to make and will maintain a high degree of accuracy.

A tool steel ring is hardened and the i.d. ground to a snug slip fit with the part. The o.d. of the ring is ground concentrically with the i.d. The ring is then split into three equal sections with a rubber wheel. The three pieces are then held together with a snap ring. In use, the chuck jaws themselves are ground in the machine they are to be used on to fit the o.d. of the ring. This guarantees accuracy. The ring is slipped over the work and the clamping pressure of the jaws on the ring will hold the work securely in place.

In buying worm gears here is a helpful, improved rule

By W. F. Schaphorst, M.E.

For buyers of worm gears here is a new rule on worm gear efficiency. It is more accurate than other rules thus far given in print. It relates to single worm reductions, and is as follows: Multiply the reduction ratio by 0.0047

and subtract the product from 1. Thus, if the reduction ratio is 50 to 1 we have this: 50×0.0047 equals 0.235. Then $1 - 0.235$ equals 0.765 equals 76.5% efficiency.

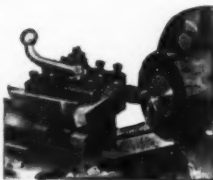
It should be noted that this rule relates only to "single reductions" and it might be well to add that it should not be applied if the reduction ratio is greater than 100 to 1. Why? Because it is obvious that at some point the rule would show an efficiency of zero, and that would be wrong. For instance, if you will try to work out a reduction of 213 to 1 you will find that the rule gives an efficiency of exactly zero because 0.0047×213 equals 1. Subtracting 1 from 1 you get zero, of course. So, don't apply the above rule to single reductions greater than 100 to 1.

As a matter of fact single reductions as great even as 100 to 1 are seldom made because of their inefficiency. Higher efficiencies are attained by using two reductions. Two reductions, usually, are enough. To explain the

Enco TURRET TOOL POSTS SAVE VALUABLE SETUP TIME

The three photos at right illustrate the flexibility of 12-position indexing, whereby each tool may be used in three different working positions.

$\frac{3}{8}$ " square tool bit mounted in Model 4 $\frac{1}{2}$ -S turret used for facing cut.



✓ Accurate within .0005.

✓ Keeps setting accurately.

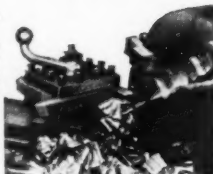
✓ 12 position indexing.

✓ Indexing is self-contained — eliminates all chip-interference.

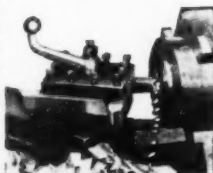
✓ Hardened steel construction.

✓ Mounts rigidly in compound T-slot.

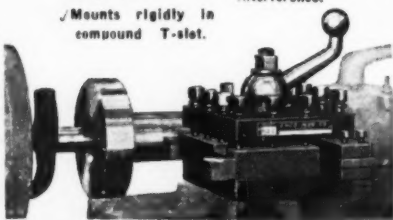
The same tool used for broadface turning merely by indexing turret 1 position or 30°.



Same tool used for inside chamfer merely by indexing back 2 positions or 60°.



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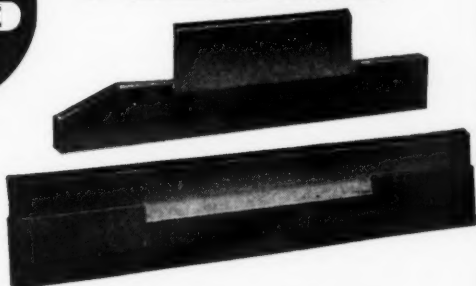
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point, let us take an example in which the total reduction is to be 50 to 1, the first reduction to be 5 to 1 and the second reduction 10 to 1. That will give us a total reduction of 50 to 1 because 5×10 equals 50. Applying the above rule for each reduction we have:

First reduction, $1 - (.0047 \times 5)$ equals 0.977 efficiency.

Second reduction, $1 - (.0047 \times 10)$ equals 0.953 efficiency.

Now to find the over-all efficiency we must multiply these two efficiencies together and we get 0.977×0.953 equals 0.93. This means that the efficiency will be 93% as compared with the 76.5% efficiency computed above using only a single reduction.

Again, let us say that you want a reduction of 2500 to 1. The result can be obtained in several ways, but let us first try a double reduction of 50 to 1 and 50 to 1. That will give us a 2500 to 1 reduction because 50×50 equals 2500. In the first problem above we found the efficiency of a 50 to 1 reduction, single wheel, to be 76.5%.

Double reduction we would then have 0.765×0.765 equals 58.5 per cent efficiency. In other words, nearly one-half of the energy would be lost in friction.

From an efficiency standpoint it is obvious now that it would be better to make it a quadruple reduction. Thus above it was shown that by using a 5 to 1 and 10 to 1 double reduction the efficiency would be 93%. So, using two such reductions in series the over-all efficiency of the quadruple reduction would be 0.93×0.93 equals 0.86 or 86% efficiency as compared with 58.5%. The power saving would be considerable, over 27%.

Metal brackets for saw horses

By Ed Hessmer

In Washington, D.C., recently we noted some scaffold horses made with metal brackets that have been in use in the construction business in the eastern area for some time. These brackets make very sturdy horses that can be quickly knocked down for efficient transporting and neat storage and would have application in industries.

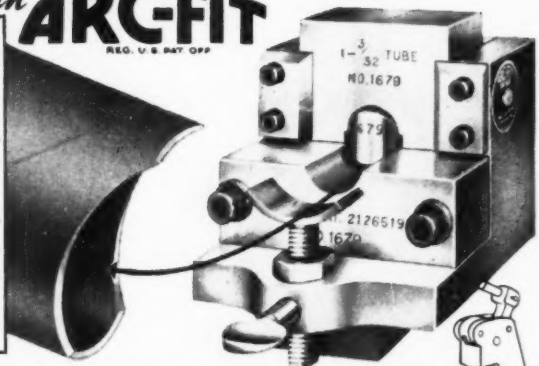
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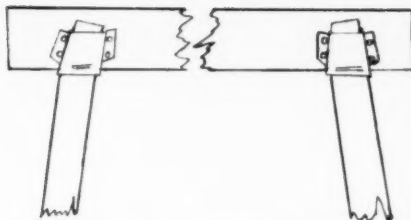


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maintenance and repair departments.

Brittin brackets call for double-wedge shaped legs, which take care of lumber shrinkage. More load automatically makes legs fit tighter, giving a more rigid scaffold.

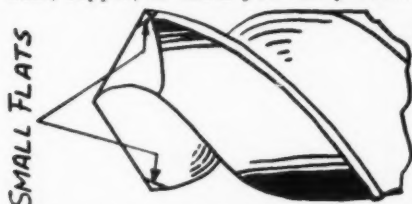
Bracing is unnecessary as the brackets are bolted through the cross-head with four bolts, and with the double-wedge leg, a stiff joint is effected at the spot where a horse usually weakens.

All brackets are the same shape, no right or left, of 12 gage steel bolted to the cross-head with $\frac{3}{8}$ " x $2\frac{1}{2}$ " bolts. Any leg fits any bracket.

Keeps drills from grabbing when breaking through sheet metal

By Henry A. Roy, Sr.

When you are going to drill a hole in a thin piece of sheet metal, aluminum, copper, or brass you can prevent



the drill from grabbing the work as it is breaking through by simply grinding a small flat at the tip of the cutting edges as shown.

Suction cups aid in handling

Common rubber suction cups are being used at Temco Aircraft Corp., Dallas, Tex., to eliminate much of the difficulty normally experienced by punch press operators in the handling of routed parts which have not been cleaned and deburred.

To eliminate the need of an extra

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burring operation, the plant follows the practice of performing punch press operations on routed parts prior to burring. Operators, however, had experienced considerable difficulty in handling such parts, due to sharp burrs and router coolant oil residue. Minor



cuts and broken fingernails were among the hazards.

Gerald Peck, 5702-A West Claridge, Dallas, a punch press operator, found a simple solution to the problem by attaching a small suction cup to a ring.

Worn on one of the operator's fingers, the cups facilitate picking up and handling of relatively large parts and have almost completely eliminated almost all the difficulties formerly encountered.

Taking the squeal out of the big planer

By William E. Donovan

One of the first utterances the old timers hear when a man new to machine shop life appears on the scene is the cry of, "Does that planer always make that screeching noise?" The old timers have listened to that planer holler like that for the past 30 years, probably.

The answer to this problem is simple. First of all, scrap those cast iron pulleys and then replace them with pulleys made of aluminum. The whole secret lies in the great difference of weight between those cast iron pulleys and the aluminum ones. For a shop that has its own foundry this changeover would be a cinch.

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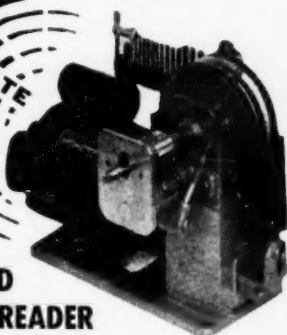
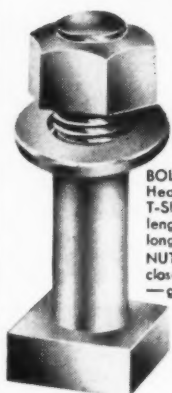
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in angles, bars,
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A simple and rugged machine for
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accurately and speedily by hand.
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pieces can be threaded on a
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Its features:

Solid head, hardened, ground and
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Two Verniers, to obtain otherwise dif-
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Compact design to permit the use of
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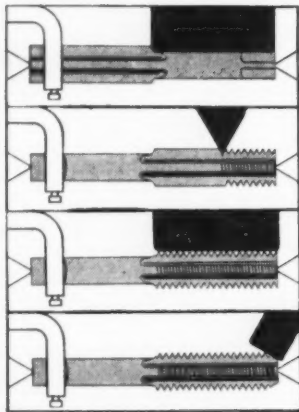


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..... the first step in insuring concentricity between the chuck and the threads on the tap itself.

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..... another step in maintaining necessary concentricity between shank, pitch diameter and crests of the thread.

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MODERN TOOLS

Increase in Trepanning Production Realized by Use of Cemented Tungsten Carbides

IMPRESSIVE production increases—up to 1000 per cent—are illustrated in three different trepanning operations by use of Kennametal cemented tungsten carbide tools on forged steel workpieces.

Forged steel line shafts, 9- $\frac{3}{4}$ " dia. by 30' long, are now being trepanned with cemented tungsten carbide triple edge tool mounted in a 4- $\frac{1}{2}$ " dia. trepanning head, figure 1. Operating at 250 r.p.m. and 0.006" feed, this tool cuts a 4- $\frac{1}{2}$ " hole through the workpiece at a rate of 8' per hour on a converted 50 h.p. Niles boring lathe.

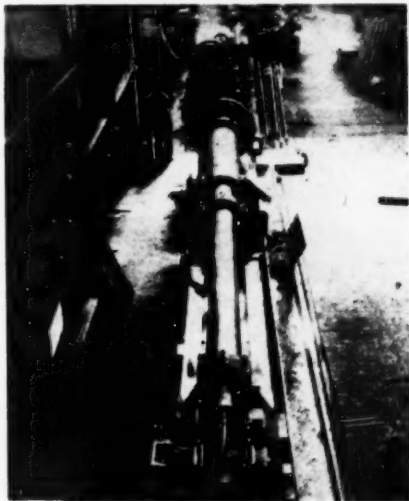
The 30' line shaft is bored half way through, then reversed and bored from the other end. After each 15' penetration, the trepanning tool is reground to assure smooth performance with longest tool life.

Three cutting edges of the $\frac{3}{4}$ " wide tool divide the chip into three sections which are curled and broken up by parallel chipbreakers for easy disposal.

Heretofore this operation was done with a high speed steel spade drill in ninety hours floor-to-floor time. With the triple edge Kennametal tool, time is now only eight hours.

In another instance, forged steel rolls, up to 28" in dia. and 46' long, are tre-

Typical trepanning operation on steel roll 21 $\frac{1}{2}$ " dia. x 12 ft. long being bored to 15 $\frac{1}{4}$ " I.D. on converted Niles boring lathe. Coolant is pumped in through inside of trepanning bar and around core. Chips flow out with coolant between the o.d. of bar and i.d. of bore.





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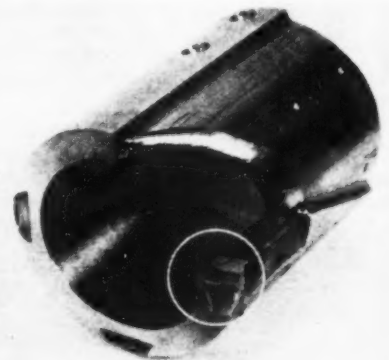


Grade K4H triple edge trepanning tool and chips formed in trepanning 24" dia. hole through a 46 ft. long line shaft. Operation done at 200 s.f.m. and .008" feed. Heretofore job required 250 hours machining time with h.s.s. tools. Now done in only 54 hours with the K4H tool.

panned with a cemented tungsten carbide triple edge tool mounted in a long trepanning head as shown in figures 2 and 3.

With this tool cutting at 200 surface feet per minute and 0.008" feed, a 24" dia. hole is trepanned through the 46' long line shaft with ease. In both the above instances, cores are then used

Kennametal Grade K4H triple edge tool mounted on $4\frac{1}{2}$ " trepanning head. Cuts a $4\frac{1}{2}$ " dia. hole through 30 ft. long forged steel line shaft at a rate of 8 ft. per hour. Operation done on converted Niles boring lathe at 250 r.p.m. and .006" feed. Floor-to-floor time with h.s.s. spade drill was 90 hours. Now it is only 8 hours.



for smaller diameter parts, thus providing a worthwhile savings in essential material.

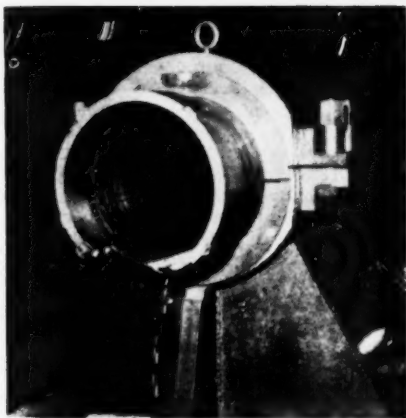
This operation, which heretofore required 250 hours machining time with high speed steel tools, is now performed in only 54 hours with a Kennametal trepanning tool.

Outside diameter of the steel roll is turned on another lathe prior to setting up for the trepanning operation on the converted 48" Niles lathe. To handle such long rolls it was necessary to extend the lathe bed and install a 40 h.p. motor.

Rolls are bored halfway through, reversed and then bored from the other end. The two holes meet at the center with negligible runout.

Tools are touched up after each penetration regardless of condition to assure longer life and smoother performance. Boring halfway through these large rolls represents over forty miles of lineal cutting per grind.

A typical operation is shown in figure 4 in which a 12' long 21-1/2" dia. roll--



Triple edge tool in 24" dia. trepanning head. Four Kennametal wear pads on side of trepanning head guide the cutting tool during the operation to assure a true hole. The resulting 21 1/2" dia. core is used for smaller dia. parts, thus providing a worthwhile saving in essential material.

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a core from a previous cut—is being trepanned to 15- $\frac{1}{4}$ " inside dia. by removing a 12- $\frac{3}{4}$ " dia. core. The Kennametal cemented tungsten carbide tool cuts at 56 r.p.m. and 0.008" feed.

Trepanning bar is a stationary tube with the single tool mounted as shown in figure 3. Four Kennametal wear pads shown on the side of the trepanning head guide the cutting tool during operation to assure a true hole.

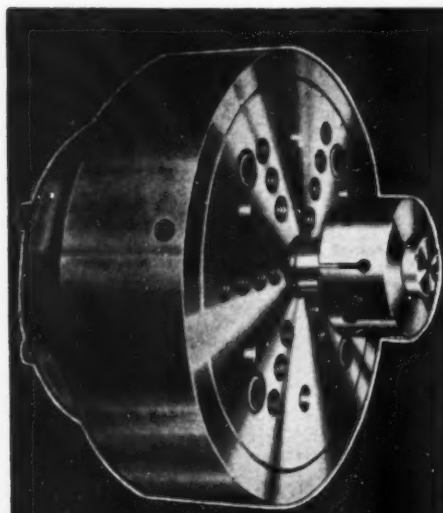
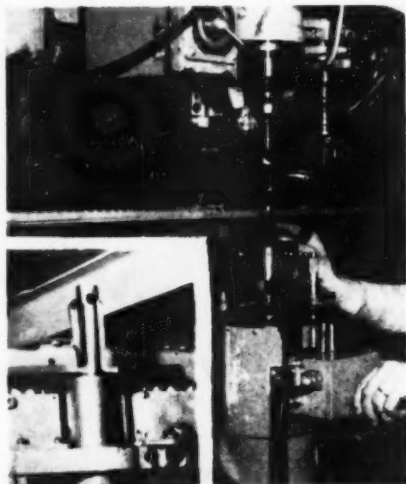
Cutting a path about 1- $\frac{1}{4}$ " the carbide tool's three work edges divide the chip into three sections, which in turn are curled and broken up by the parallel chipbreakers for easy disposal.

Coolant on all the above operations is pumped in through inside of the trepanning bar and around the core at approximately 110 pounds p.s.i. of pressure. Chips then flow out with the coolant between the outside diameter of the bar and the inside diameter of the bore.

Feeler switch assembly helps at Temco

A feeler switch assembly, used in

conjunction with a remote controlled lateral shifting installation on General Drivmatic riveting machines, has completely eliminated the danger of press-



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ing rivets too near the edge of hat section stringers at Temco Aircraft Corp., Dallas, Tex. The new device automatically holds the riveter clamp within a set distance of the stringer edge.

The new installation, which was designed by C. H. Rowan, a Temco maintenance electrician, is used in the riveting of P2V wing panels which Temco is manufacturing for Lockheed Aircraft Corp. The switch assembly is used in conjunction with a Temco-designed remote-controlled panel-shifting installation which has been made on Lockheed-designed tables.

Specifications require that the distance between the edge of the stringers and the center of rivet holes must be held within certain tolerances, a difficult task in cases where stringers are not absolutely true. Previous to the development of the feeler switch assembly, the operator had to use his own judgment in compensating for warped stringers.

The switch assembly, which is mounted on the lower ram clamp assembly of the riveter, consists of two units, each of which contains two 10 amp, 115 volt thin nest precision coin switches of the type used in coin operated vending machines. Each unit has a finger-like actuator which requires only 3/32" movement to actuate either of the two switches in the unit.

The actuators of the feeler switch assemblies are partially concealed in vertical recesses which are cut in the redesigned clamps. When the riveting machine is in operation, the switch actuator is in constant contact with the side of the hat section stringer. If the stringer moves to far from—or too close to—the clamp, the actuator energizes one of the two coin switches, thus energizing the lateral shifting mechanism and returning the stringer to its proper position in relation to the clamp.



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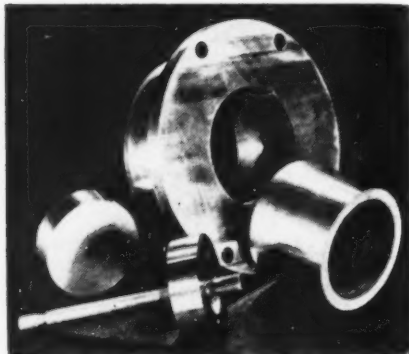
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Wear resistant materials lengthen production runs for grinding-wheel molds

Not too long ago, lengthy production runs in industrial plants were impeded, not by the materials used in fabricating the production equipment, but by performance capabilities of the latter.

Today, the tables are turned. Automatically, higher speeds and around-the-clock production runs are "putting



the pressure" on materials. One answer is using wear-resistant materials on vital equipment components to lengthen production runs and overcome expensive down-time.

At Carborundum Co., Niagara Falls, N.Y., where Carboloy tungsten carbide-equipped molds are used in producing silicon carbide and aluminum oxide grinding wheels $\frac{1}{8}$ " to $4\frac{1}{2}$ " dia., the wear-resistant inserts are providing an over-all average working life about ten times that of other engineering materials. One 4" mold on an automatic press, for instance, produced as many as 86,000 pieces and was still in good condition. The mold employed previously lost its efficiency at the end of 2,500 pieces.

Cost of the tungsten carbide molds, according to Carborundum, averages about three times that of steel. But the cost is more than offset by the wear-resistant qualities of the tungsten carbide metal. The material used in grinding wheels is very abrasive, and the particles act as millions of tiny grinding wheels, grinding away the

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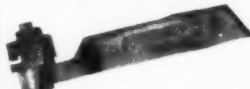
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(*Reps. Tool Company, Inc., a Walton affiliate.)

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THE WALTON COMPANY, Hartford 10, Conn.

metal sides of the molds employed to shape them into wheels under pressure. Rapid wearing of the molds impedes long-run production of uniform size grinding wheels, and makes it necessary to replace the molds frequently to keep the wheel dimensions within specifications.

In using tungsten carbide mold assemblies on automatic presses, mold replacements at Carborundum are reduced drastically. On one automatic press, for example, a total of 180,000 pieces was produced at the rate of 1,000 per hour. Since a third of this quantity could not be made with molds of other materials, the saving on setup time alone amounts to about two thirds. Furthermore, when the tungsten carbide molds are worn, they are not scrapped but resized for re-use, or employed in producing larger grinding wheels.

An accompanying illustration shows one of the die assemblies used for manufacturing 3" diameter silicon carbide and aluminum oxide wheels. The

barrel liner, at lower right, is of grade 883, and the core pin, lower left, is of grade 44A furnished by Carboly Department of General Electric Co., Detroit, Mich. The first is a material that provides high resistance to wear and is fairly tough. Grade 44A is tougher than 883 and also provides good resistance to wear.

Rotary straightener solves tubing problem

The straightening of a rapidly growing volume of drawn stainless steel tubing, having up to 225,000 p.s.i. tensile strength, was a major problem in 1951 at Tube Methods, Inc., Bridgeport, Pa.

A parallel problem was to effectively straighten new types of tubing having a composition of alloys to provide high corrosion and/or high temperature resistance.

Both of these problems were successfully solved by the installation and operation of a Mackintosh-Hemphill rotary straightener.

Although a four-speed drive was

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extra cost, for those who place scraper handle against body for extra leverage. Three sizes: 18"—20"—22" long. Furnished with high speed steel or Carboly Blades. Cost less than home made scrapers.

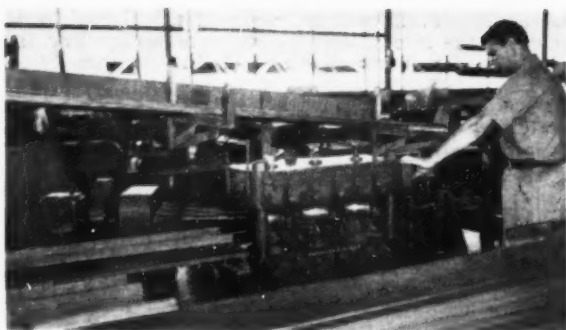


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ANDERSON BROS. MFG. CO., Rockford, Ill.

*Balancing Ways, Roto Checkers, Hand and Power Scrapers,
Spotters, Hand and Power Hydraulic Straightening Presses.*

This rotary straightener in the Bridgeport, Pa., plant of Tube Methods, Inc., effectively straightens new types of tubing having a composition of alloys to provide high corrosion and/or high temperature resistance. The Mackintosh-Hemphill machine works on this tubing up to $\frac{7}{8}$ in. in diameter; having walls as heavy as .095 in.; in 20 ft. lengths, and at a production speed averaging 150 ft. a minute.



added to the Model AX, the company found expanding plant production could be paced without shifting from the initial low speed setting. A monthly average of 400,000 ft. of tubing has been straightened, with a peak at 525,000 ft.

The special composition tubing, annealed within 100 deg. F. of the metal's melting point, is said to offer far more resistance to straightening than stain-

less steel and other metals. The new straightener works on special alloy tubing up to $\frac{7}{8}$ in. diameter, having walls as heavy as .095 in.; in 20 ft. lengths, and at a production speed averaging 150 ft. a minute.

Most of the stainless steel tube straightened on the Mackintosh-Hemphill machine varies in size between .1875 and .625 in. Certain tubing



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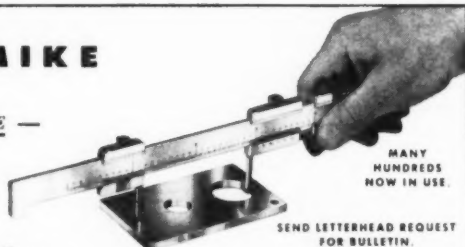
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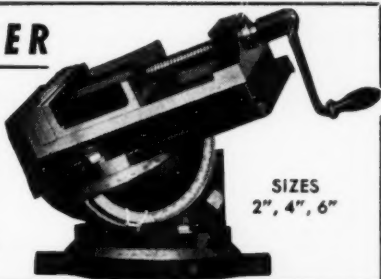
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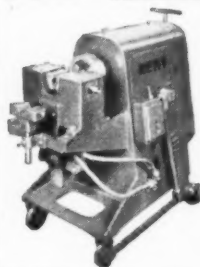
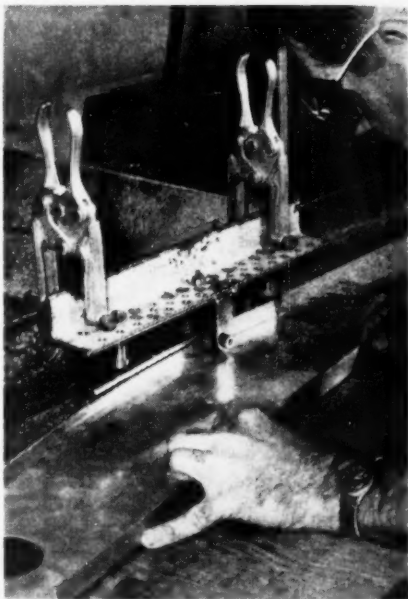
SIZES
2", 4", 6"

used in reciprocating and jet aircraft engines is 1.1875 in. OD, with .032 in. wall thickness. In production and straightening, this stainless tube is held to a diameter tolerance of .001 in. per 20 ft.

Speed trimming of contour frames

A special attachment for Yates American shapers is being used at Temco Aircraft Corp., Dallas, Tex., to enable one man to trim large contour frames in less time than was required by two operators under the methods previously used.

Previous to the development of the device by Floyd I. Wright, 123 Summit, Grand Prairie, an employee, the company followed the general industry practice of bolting the frames to wood forms for trimming. As some of the frames were large, the forms were heavy and hard to handle. Two men were required to handle many of the forms and the hands of the operator were in constant danger from the un-



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protected cutting blade. In the event of a warped form, it was often necessary to discard frames due to incorrect trimming.

Basically, Wright's attachment consists of three fiber rollers mounted on a section of angle iron. Two of the rollers are mounted on a vertical axis and roll on the inside of the frame's flange, holding it against the saw. The third roller, which is mounted on a horizontal axis, rolls on the flat surface of the frame, holding it against the table top. The entire assembly is secured to the guide angles of the shaper by two quick clamps.

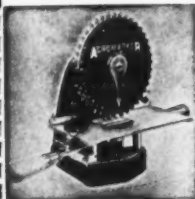
Since Temco adopted Wright's device, there has been no necessity for a large stockpile of wood forms. One man can perform almost all trimming operations, as the attachment does all holding, making it unnecessary for the operator to do more than feed the frames to the saw. There is no necessity for the operator's hands being near the blade, thus eliminating a safety hazard.

Oil-Hydraulics turn close tolerance problem into high speed production

A job offered for subcontract bids by Fee and Stemwedel, Inc., Chicago, seemed to be one nobody wanted, because not one bid was received. The



specifications called for 120 close tolerance serrations, or 90° angle cuts, around the rim of a half-hard brass compass bezel—the notches to be only .018 inches deep, with an allowed tolerance of only plus or minus .003 inches.



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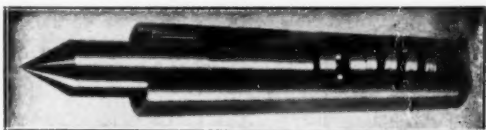
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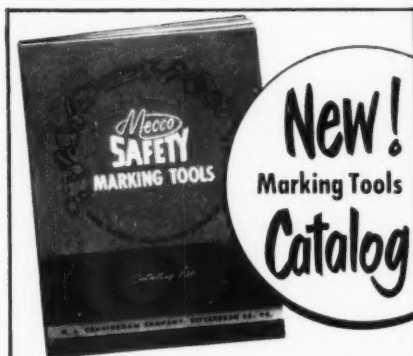
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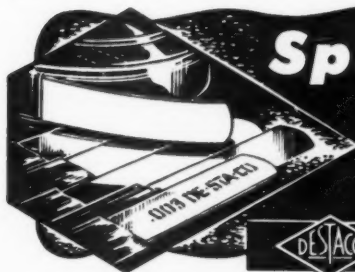
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DETROIT STAMPING COMPANY

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The relatively deep cut in the thin walled part had a tendency to distort the metal. And avoiding scrap losses presented a problem.

To overcome this serious production obstacle, the company decided to do the broaching operation in their own plant. An oil-hydraulic Multipress was selected to cut the serrations around the compass bezel at the high speed required to meet production demands. The six-ton press they installed ac-

curately broaches the parts at the rate of 800 per hour. 6400 in an eight-hour day.

In the actual operation, the parts are pushed through the cutting die by smooth, hydraulic ram action. They travel on through the U slot of the press bed and stack automatically on a post for easy transfer to tote boxes. The controlled pressure and speed of the press ram eliminate the possibility of press-caused scrap losses. For instance, on a typical run of 19,952 parts, only 48 were scrapped, and then only because they were improperly placed by the operator.



Because the press is set up to operate with automatic accuracy, women operators without special training are able to handle the work.

Fee and Stemwedel is also attaining excellent results with Multipress in a stamping process. A single operation stamps the date in the cover of the compass and shaves the edges of the part at the same time. It is essential that the stampings be clear-cut and uniform, since the date determines how long the

GRAHAM **DIAL TYPE** **HIGH SPEED** **UNIVERSAL** **MILLING MACHINE** **FORWARD AND REVERSE** **POWER RAPID TRAVERSES IN** **ALL DIRECTIONS.**



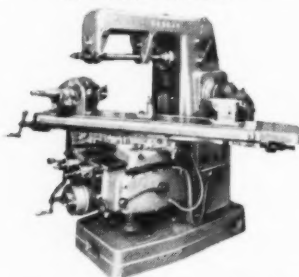
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compass is to be used before being re-checked for accuracy. A production rate of 4500 each eight-hour day is attained, and here again the press is handled by unskilled operators. The press ram reverses at a preset pressure, assuring uniform stamping regardless of dimen-

sional variations that are sure to occur in die-castings of this type.

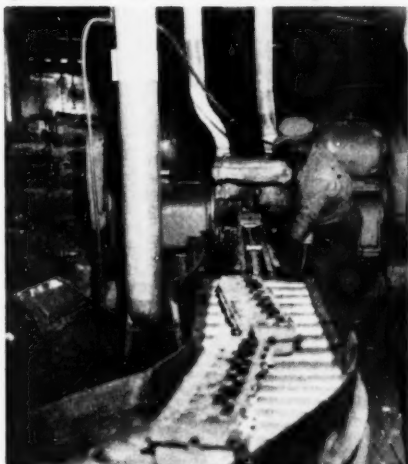
On both the broaching and stamping operations, the hydraulically driven ram has shown marked advantages in such close-tolerance operations on relatively fragile parts.

Savings in grinding rough cylinder head castings

One of America's leading automobile manufacturers has achieved big man-hour savings in the processing of rough cylinder head castings by instituting a modern grinding operation. The problem is to remove the rough metal fins protruding from the sides of the cast iron head as they come from the molds and maintain the necessary rate of production—currently 1600 castings a day.

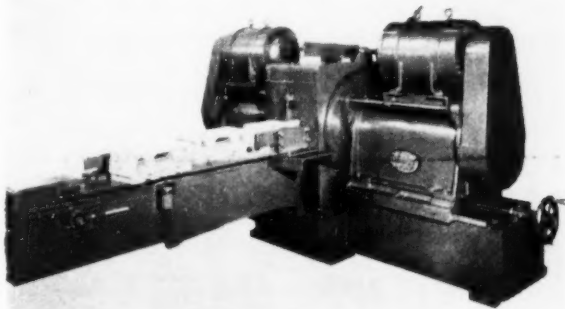
Before installation of the Besly grinder that is used for snagging, hand chippers were employed to remove the fins from the castings. This was a tedious process, but it was production policy to meet the required cylinder head quota daily no matter how many men had to be put on the job. Therefore, much manpower was tied up in this one operation.

Now, only one man and a No. 630-30" Besly double spindle dry grinder are necessary to keep up with production line demands, figure 1. The setup works like this: When the molds are shaken out, the hot castings are brought to the grinder on a gravity conveyor. The grinder operator breaks off larger pieces



1. Besly No. 630-30" grinder at work on cylinder heads. Notice how castings are conveyed directly to power driven feeding fixture. See how shoe hold down casting as lug on feed chain pushes it through grinder.

2. This Besly No. 630-30" double spindle dry grinder is fixtured for smooth-surfacing tops and bottoms of concrete blocks. Power feeding again speeds and simplifies the operation.



of excess metal with a few hammer blows and rolls the castings from the conveyor onto a power driven feeding fixture on the Besly grinder. The heads are then automatically fed through the grinder, and the fins, 3/16 to 5/16 inches

thick, are snagged off at a single pass, producing clean, smooth, ready-to-machine castings. By doing the job this way, the manufacturer makes considerable savings in labor, and gets better, more satisfactory results as well.

Individual drills cut cost

To cut down on the costly movement of men and machines from one operation to another, the Binghamton Die and Machine Co., Binghamton, N.Y., installed Delta 14" drill presses on each operator's workbench. As a result, operating costs were reduced and work flow made smoother. Of the 19 Delta drills in the shop, two with special attachments are used by all operators, the other 17 are assigned to individual workers. Total maintenance cost on all machines is less than \$20 per year. The firm manufactures dies for shoe companies. Pictured here is a view of the drill-equipped workbenches.



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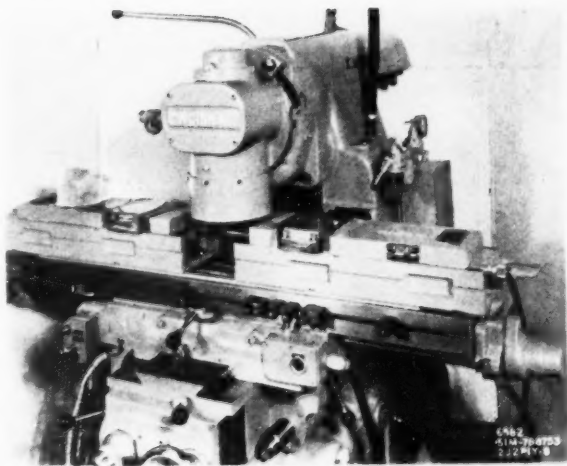
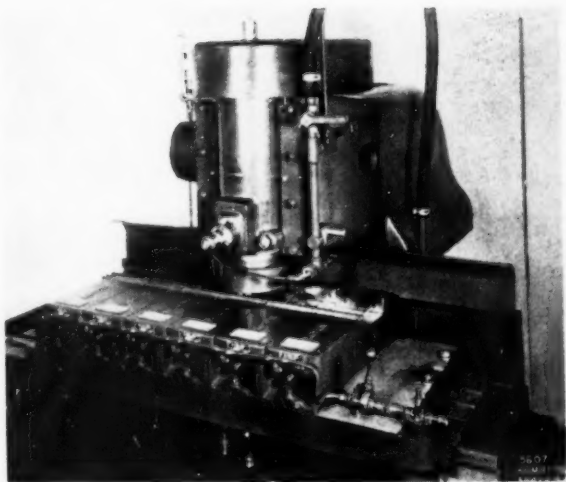
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MUMMERT-DIXON CO., 122 Philadelphia St., Hanover, Pa.

Applications of Airlox vise on milling machines

The top photo shows six Airlox Model S-50 pneumatic vises mounted on a vertical milling machine for bar milling operations. These vises were machined as a set. The vise bodies were ground for thickness; and the same tolerance was held on all the vises from the cross base keyway to the fixed jaw casting face. Because the fixed jaw on the Airlox Senior Pneumatic vise is toward the center of the vise, and is firmly keyed into the vise body, then with the close tolerances held, the fixed jaws of the six vises are in positive alignment, when the vises are set on a common key through the cross base keyways. Random lengths of bar stock can be machined because each vise actuates its own movable jaw, and the work is held rigidly throughout the entire length of the cut. In this application each vise exerts a grip of 90 times air line pressure on the work. This means that the six vises operating as a power fixture exert a total grip on the work of 54,000 lbs. jaw squeeze from a 100 lb. air line, when a bar is held in the full width of the six vises.



The bottom illustration pictures two of the Model S-50's mounted on a vertical milling machine. These vises are tooled so that one vise can be unloaded and loaded while the work in the other vise is being machined. This means that

loading and unloading time on this operation has been reduced to a minimum. Vise grip on the work is 90 times air line pressure, or 9,000 lbs. grip in each vise from a 100 lb. air line.

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Judge it from any angle: for accuracy, stamina, rigidity or capacity (for size). Check its component parts—its spindle, spindle bearings, lead screw, apron, carriage, bed, gearing, or the power delivered by its drive—you will find the SHELDON Lathe a quality tool both in appearance and "under the hood".



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What's New

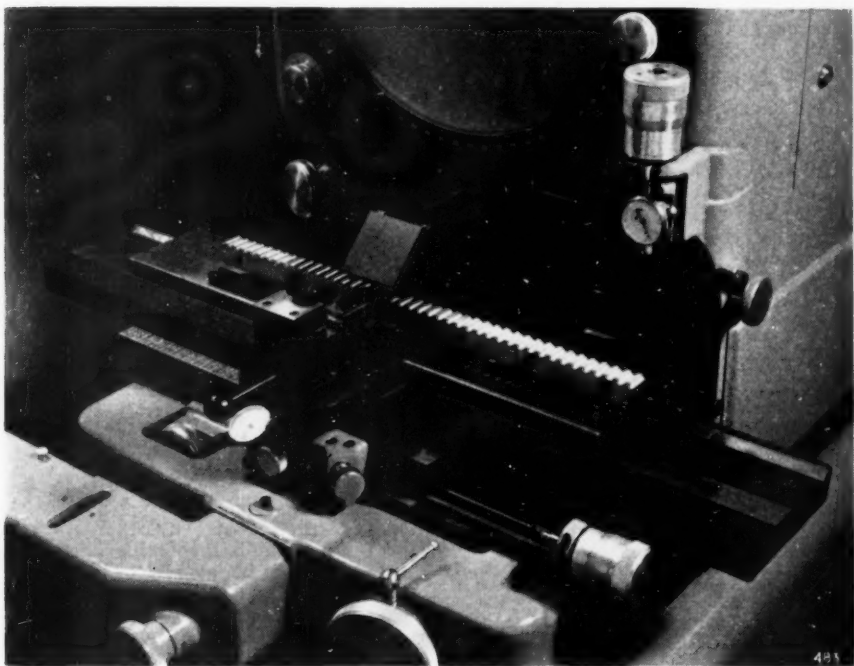
IN

METALWORKING

Contour Projector Checks Broach Teeth

OPTICAL GAGING Products Co., Dept. BB, 26 Forbes St., Rochester 11, N.Y., has announced a contour projector that makes possible checking of all teeth of

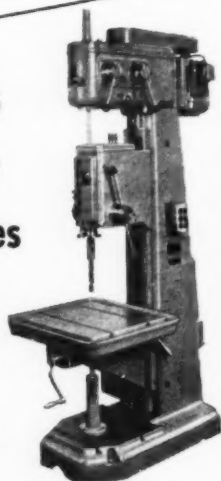
broaches for tooth form, spacing and wear for the entire length of a broach. Utilizing the unique design of the optical system of the Kodak projector



Price Complete
\$1985
Delivery from Stock

ALFING Heavy-duty drill presses

Quick changeover from job-to-job on short or long run heavy-duty drilling production is assured by easily adjustable head and table on ALFING DRILL PRESS.



Crank raises or lowers table; headstock moves 6" up or down by hand on scraped ways. Easy-to-reach controls cut handling time, too. 9" quill-supported spindle stroke, driven by 3½ h.p. V-belt motor. Motor speed 900 rpm. Drilling capacity of 1" in steel; 1¼" in cast iron. 8 spindle speeds from 150 to 1640 rpm. Drilling feed by hand or power. Table surface 26"x28". Scraped base plate may be used as table for extremely bulky work pieces. Distance between spindle and table, 23" max.; spindle and base plate, 25"-40". Write for descriptive literature.

Engineered servicing and stock parts within 48 hours from Orban Service Centers in Newark, Detroit, Cleveland.

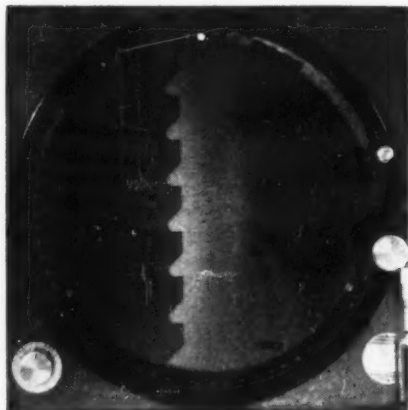
KURT ORBAN COMPANY, INC.

205 East 42nd St., New York 17
 19450 James Couzens Highway, Detroit 35
 4220 Prospect Ave., Cleveland 3
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 Distributors from Coast-to-Coast

Canadian sales by European Machinery Ltd.,
 11 King St., W., Toronto

with its 1000 watt surface illuminator, broaches themselves can now be gaged optically as well as the product, it is claimed.

The optical system of the projector permits light to emanate from a high intensity light source located within



the cabinet containing the optical system. By means of a telecentric mirror, rays from the light source pour out of the same optical system as is used for projecting the image of the part onto the view screen. A 45° mirror attachment placed over the front relay lens bends the light coming from within downward, upward, or sideways as may be required. As it strikes the part held in the focal plane the image of this part is reflected back through the same optical system on to the viewing screen. This image on the viewing screen is magnified 10, 20, 31.25, 50, 62.5 or 100 times as may be desired. Changing from one magnification to another is accomplished by merely turning the selection dial to the magnification desired.

A specially designed broach locating fixture is placed and locked on the work stage of the Model 11A Kodak contour projector. The base of this fixture is approximately 34 inches long; however, this can be made longer if necessary. On this base is mounted a broach carrying slide and indexing head. The slide is moved on accurately scraped ways,

by merely turning whichever of the pinions is meshing with the rack attached to the rear of the slide. Two black hand wheels at rear of the fixture are conveniently positioned for the operator.

The broach, as placed on the fixture, rests against mounting blocks of the indexing slide member and against a magnetic stop at the end of the slide. The magnetic end stop is adjustable to allow for lateral adjustment of the broach if necessary without moving the entire fixture or work stage. When checking various teeth, the broach is indexed across the path of the optical system in accordance with accurately positioned indexing notches. The indexing head is fixed to the base member of the fixture, and carries two special metal mirrors which can be moved as a unit in and out between the teeth of the broach to positive stops at each end of its travel. Positioning this mirror assembly against the forward stop places the mirrors on either side of a row of teeth for tooth to tooth inspection.

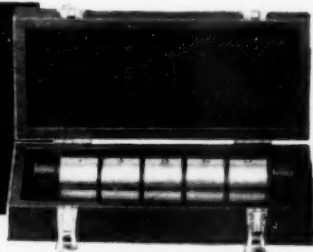
Inadvertent forward thrust of the mirrors against the broach is prevented by a stop pin which must be raised in order to allow forward movement of the assembly toward the broach. Pulling the index handle first removes the mirror assembly from the broach and secondly pulls the stop from the index bar, in a double action.

An adapter is supplied with this fixture which is inserted behind the standard 45° mirror attachment of the Kodak contour projector. This is used in order to extend forward the focal position for the broach. Light coming from the 1000 watt surface illuminator out of the optical system is directed by means of the 45° mirror attachment downward toward the two special metal mirrors as positioned flanking any one row of broach teeth. The light striking these mirrors is reflected toward the opposite metal mirror and then returned upward through the same optical system from which it came. This results in a silhouette shadow of the tooth form being projected at desired magnification onto the viewing screen.

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THE SERVICE SHOP TO INDUSTRY FOR OVER A QUARTER CENTURY

Variety of cuts with boring bit on one general grind

An ingenious boring bar and bit combination, developed over the past year, has just been announced by the Verne E. Swift Experimental Machine Shop, Dept. BB, Dwight, Ill. It is said to offer many advantages over the straight-bit

the high speed steel known as "Hi-M-Arc" and the carbide, "ArCarb." The boring bar is called Swift's "Cle-arc-utt" bar.

As the illustrations show, the cutting edge angle may be quickly changed by adjusting the bit to a new position, boring at the correct angle then shifting

1. This shows the versatile "Cle-arc-utt" boring bar and bits developed by Verne E. Swift of Dwight, Ill. The tools are stocked in 1/2" and 3/4" at present.



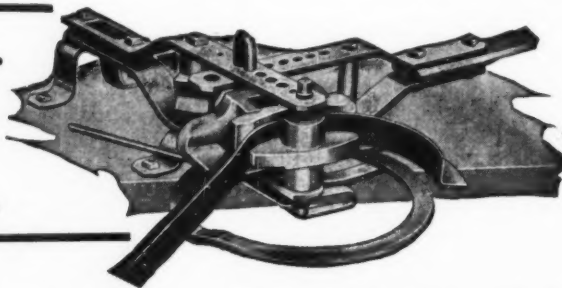
bar since the angle of the cutting edge can be varied by merely loosening a stud screw and then projecting or re-tarding the circular bit.

Two types of bits are being produced,

the bit to square-out the shoulder without grinding.

An advantage when a threading bit is used is the fact that it may be squared with the work without regrinding or

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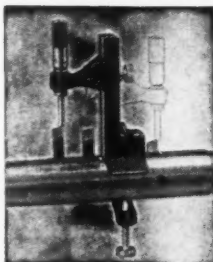
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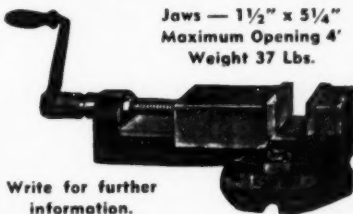
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Jaws — 1½" x 5¼"
Maximum Opening 4"
Weight 37 Lbs.



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The body is made of semi-steel; the jaws of tool steel hardened and ground. All working surfaces are ground. The vise is as accurate as is possible and the degrees are cut to very close limits.

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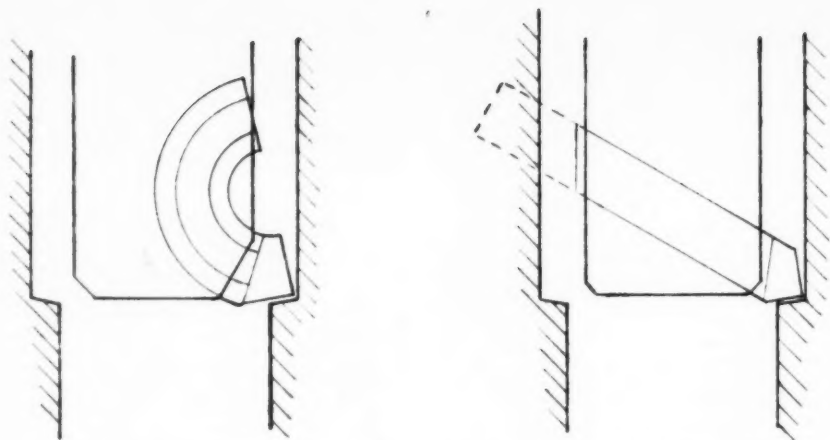
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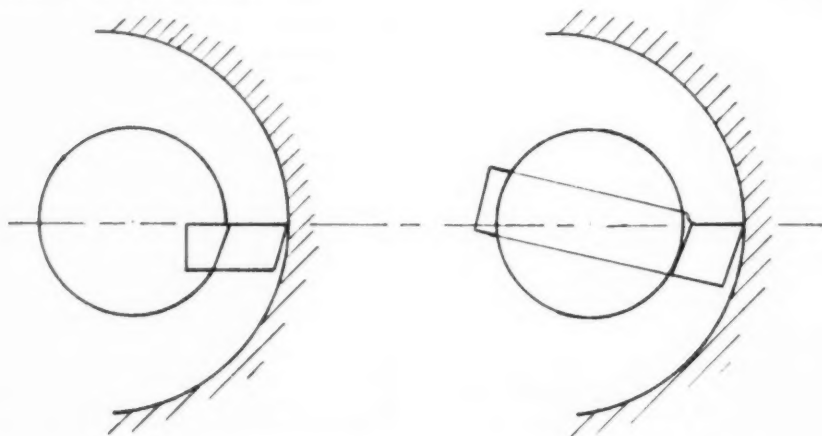
2. No breaking for clearance, as with a straight bit bar (right) is needed. The "Clear-cut" is shown at the left using a full length bit in a small diameter hole.

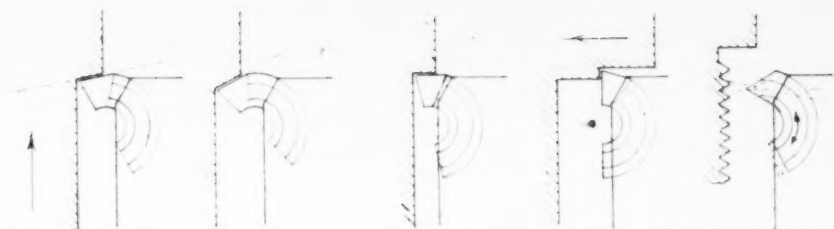
setting the bar out of parallel. Another feature is that the tool is always on the centerline level. No mutilating, centering grind-back scollops are necessary.

The top line is preserved intact to provide a fresh cutting edge constantly.

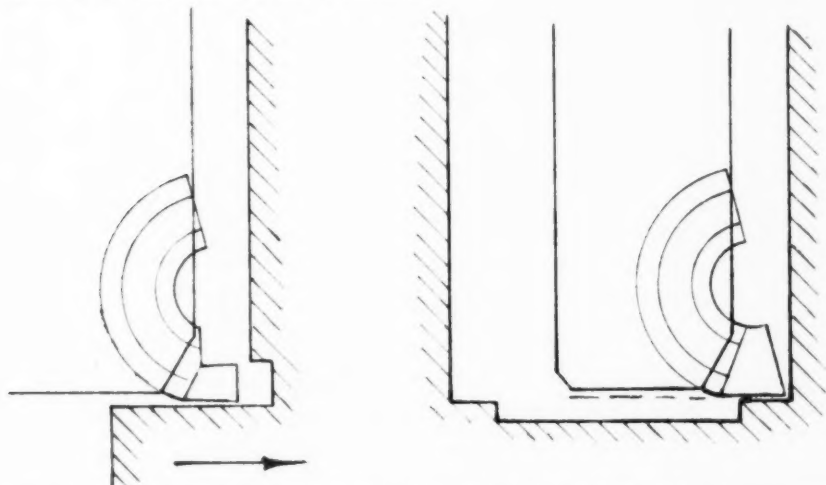
The tool is said to be able to bore to the bottom of a blind hole and square

3. The topline is preserved intact to provide a fresh cutting edge constantly. The tool is always on the centerline level, due to its circular shape, making unnecessary the centering grindback scollops.





4. By simply adjusting the bit to a new position, the cutting edge angle is changed. After boring at the desired angle, shift the bit to square-out the shoulder without grinding. When using a threading bit (right) it can be readily squared with the work without regrinding or setting the bar out of parallel.



5. This illustrates how the tool is able to bore to the bottom of a blind hole and square-out. A recess at the bottom of a hole or against a shoulder can also be accomplished.



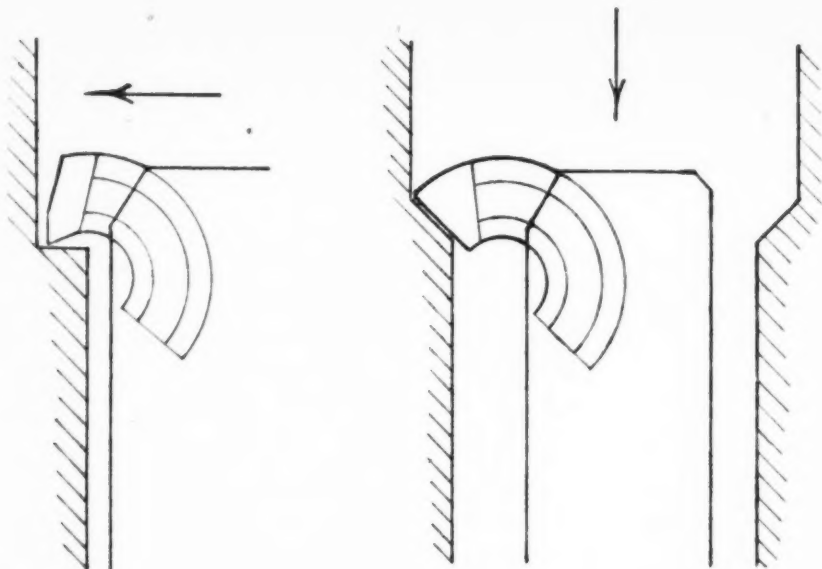
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6. Reverse boring or boring-out is useful in getting a reverse shoulder in the bore without turning the workpiece. Also shown, on the right, is a method of squaring out a reverse shoulder.

out or recess at the bottom of a hole or against a shoulder. The reverse boring or boring-out is useful in getting a reverse shoulder in the bore without turning the workpiece. This can also be applied in squaring out a reverse

shoulder. No trimming or breaking for clearance, as is sometimes necessary with a straight bit bar, is needed.

Made of hardened alloy steel, the tools are stocked at present in $\frac{1}{2}$ " and $\frac{3}{4}$ " sizes.

Magerle hydraulic surface grinding machines

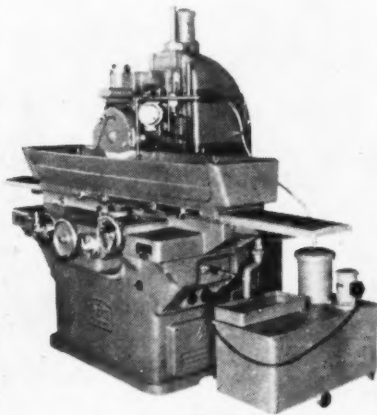
The Pellow Machine Company, Dept. BB, 13500 Foley Ave., Detroit 27, Mich., as factory representative, is introducing the Magerle tool and production surface grinding machines. These machines are said to offer exceptional accuracy and quality of finish and will complete repeated loadings of the chuck automatically to within .0002 or required size.

The automatic feature of head feed

is controlled by an independent electrical circuit, using a solenoid to operate the feeding mechanism. The amount of feed at each impulse is determined by the operator and is adjusted by a control screw which remains free for hand setting. The automatic feed operates on each longitudinal reversal of the table or, when required for automatic plunge grinding, on each second reversal of the table. The automatic feed is preset to stop when the re-

quired work size is obtained and a pilot light then signals completion. The machine requires no attendance during the grinding operation. A work measuring device equipped with a 3" indicator reveals work size relative to the required final dimension during the grinding cycle. Feeding may also be effected by a hand wheel which is graduated in intervals spaced at $\frac{3}{8}$ ", each graduation representing .0001 inch head feed. Hand controls for all motions are also provided.

A built-in wheel dresser is included as standard equipment. This is coupled to the work measuring and automatic



feeding unit. This effects an automatic setback of the automatic unit and work measuring instrument by the amount of radius reduction of the wheel when the wheel is dressed.

The table motions are hydraulically powered, longitudinally variable from ten to one hundred feet per minute and subject to feeds of the cross slide of $\frac{1}{32}$ " to $\frac{1}{2}$ ". Rapid travel is provided for the head in both directions and also for the cross slide.

The machines are built in three sizes: two, three and four feet table travel longitudinally. All models offer transverse table travel of 10 $\frac{3}{4}$ ". The maximum clearance between the wheel and the table is 15 $\frac{3}{4}$ ".

Separate motors and controls are pro-

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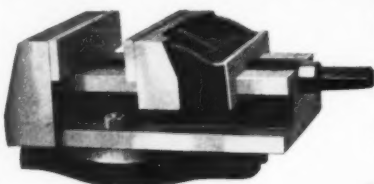


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No. 10—6" jaws, 1 1/2" deep, opens 5" wt. 45 lbs. \$68.20

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Best material and workmanship. Prices are net f. o. b. Chicago. Dealers' inquiries are solicited.

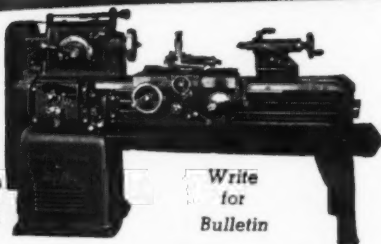
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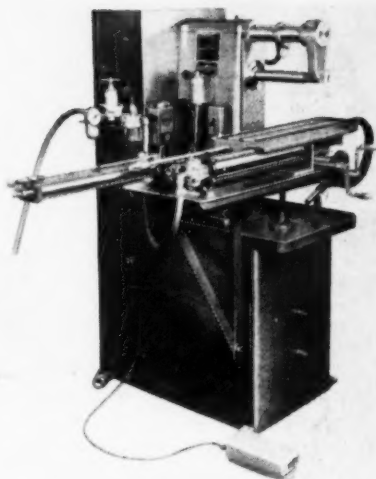
595 New Park Ave. West Hartford 10, Conn.
Phone: Hartford 32-7095

vided for each function. The electrical panel and relays are mounted in the machine base. Included as standard equipment is a transformer to reduce the voltage to 110 at the push buttons. A built-in rectifier provides 110 volts d.c. for the magnetic chuck. The electrical supply is transformed to 110 volts a.c. to separate socket outlets for a machine lamp, dust collector and wet-grinding attachment.

The grinding wheel size is 11½" diameter by 1¼" wide. The wheel is driven by a dual voltage 220/440, 60 cycle, 3 phase, 5 h.p. motor.

Crowningshield production milling machine

This milling machine made by Crowningshield-Harris Co., Dept. BB, Greenfield, Mass., has Bellows controlled air power. The use of the Bellows air motor and Hydro-Check is said to permit rapid traverse of the work to the tool, controlled feeding through the cut, and rapid return of



the work to its starting point, adding substantially to the productivity.

There is a wide range of spindle speeds (36) using interchangeable v-

world's largest one-piece surface plate



Ivan Rahn, Factory Superintendent, is shown checking the surface with an auto-collimator.

...MADE OF GRANITE

Weights 60,000 pounds, measures 20 feet long, 6 feet wide and 3 feet thick. 300*average size surface plates could be made from it.

The overall accuracy of the entire surface is .0015", every 6 foot square section is .0002" and every 2 foot square section is

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Making the huge surface plate required new engineering developments and special equipment unique to the industry.

We are honored to have been selected to produce the world's largest and finest surface plate. It is a tribute to the "know-how" and skill of our craftsmen, acquired through ten years of granite plate research and production.

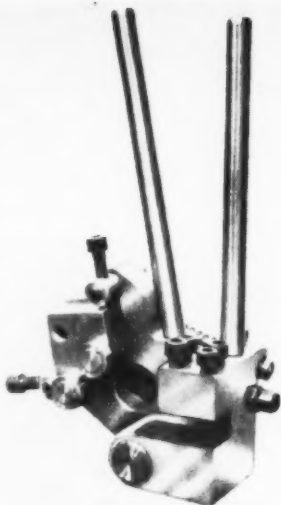
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RAHN GRANITE SURFACE PLATE CO.
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belts and pulleys, plus controlled air power.

Specifications are: Longitudinal stroke, $14\frac{3}{4}$ " ; cross feed, $3\frac{1}{4}$ " with micrometer dial ($5\frac{1}{2}$ " on special knee); vertical range of knee, 9" with micrometer dial; single phase or 3 phase 1750 or 850 r.p.m. motors optional at $\frac{1}{2}$, $\frac{3}{4}$ and 1 h.p.; spindle, No. 10 B & S taper, $\frac{7}{8}$ " bore; table, 7"x22" with standard $\frac{5}{8}$ " tee slot (2 if desired); weight 850 lbs. with standard equipment, 950 lbs. for export; overarm dia. 2-3/16"; maximum dia. of cutter, $6\frac{1}{4}$ "; size of case for export, 59"x41"x31" over-all height, 56"; floor space required, 38"x53".

New roller forming tool developed

A newly developed forming tool that replaces the cross slide on forming operations and that is said to be much faster and more accurate, has been developed by the manufacturing division of Mark C. Walker and Son Co., Dept. BB, Orange, Calif.



The Walker roller forming tool is a hand operated turret lathe attachment using any standard cutting tool to form



ONE Tool ONE Set Up

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undercutting.

MASTERHEAD THE BORING HEAD THAT THINKS FOR ITSELF

Featuring: automatic feeds, end release and return; adjustable stop; adaptable to all standard machines; highest precision; ideal for jig borers; seven models for work up to 24" diameter.

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CE Station, Bridgeport 3, Conn.

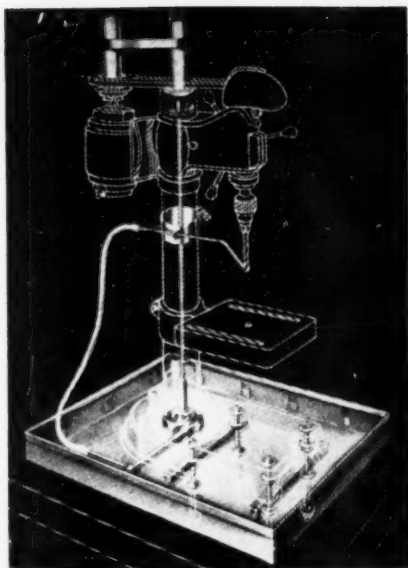
hard steels or soft alloys.

Work is supported firmly in place by rollers while the forming cut is made. With the Walker tool very close tolerances are said to be easily held by inexperienced operators and rejects are almost entirely eliminated according to the manufacturer; it also gives a true, smooth, high quality finish from stock sizes 3/16" to 2" in diameter.

Coolant pump for bench drill presses

New compactness and convenience are provided in the coolant supply unit offered by Wade and Sons, Dept. BB, 930 E. Truman Road, Independence, Mo.

It is claimed that it can be installed in a half-hour or less into the hollow column of any popular make bench drill press. No separate motor is required. Driven by the drill press motor, which is higher than the coolant supply, it eliminates the danger of electrical shock. Operating with 1/2 gal. of any type coolant, the Wade pump carries the liquid through tubing beneath the drill press. Made of extra heavy gage steel,



Multiple Spindle Magazine Feed Power Screw Driving Machines

Latest type equipment for driving screws faster in products requiring two or more screws. These machines operate easily and require very little attention or adjustment once they are put in production.

Part Feeder

Automatic Part Feeders are adaptable to production jobs requiring the handling of small parts. Parts poured into hopper are arranged and fed down track in proper order. Send sample parts when writing for quotation.



COOK & CHICK CO.
640 SOUTH MILLER ST.
CHICAGO 7, ILLINOIS



do you have a
TOOL PROBLEM

Columbus Die-Tool has been solving tooling problems for over 45 years. Expert designers and builders of all types of tools and special machinery. Write us today!

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and Machine Co.
P. O. BOX 750 • COLUMBUS, OHIO

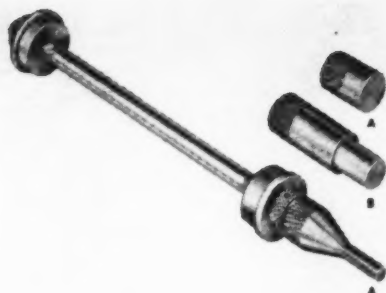
the pan is provided with clips on the sides to hold splash shields when additional height is desired. The pump intake is screened to keep out drillings that might clog the flow line. The small pan simplifies changing of coolants for different work requirements.

All fittings to adapt the device to all well-known makes of bench drill presses are supplied in the complete kit, with simple instructions for quick assembly.

New collet stop by Wade permits faster, more exact second operation work

Wade Tool Co., Dept. BB, Waltham, Mass., has brought out a new collet stop that is said to make it easier for the lathe operator to perform certain second operation work. For instance, it is frequently required that second operation work be located in the collet at the same setting every time to obtain duplicate shoulder lengths.

The Wade collet stop serves this purpose to three outstanding advantages:



1. The stop is held immovable in the lathe spindle regardless of whether the collet has an indeterminate endwise location or not, so that shoulder lengths are always held exactly the same. 2. In setting the position of the stop it is not necessary to remove the stop from the collet and the collet from the lathe for any required adjustment. The adjustments are made entirely from the rear end of the spindle with a screw-



S TRAIGHT OR
TAPER KEYWAYS
U NIVERSAL
CENTERING
N O BUSHINGS OR
BUSHING HOLDERS
REQUIRED
R UGGED STEEL
CONSTRUCTION
A TABLE TYPE FEED
Y OUR PRODUCTION
MACHINE

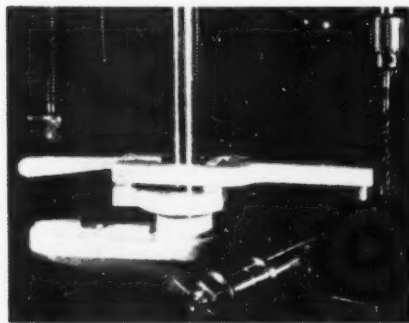
Faster and more economical cutting of keyways with **SUNRAY**. Meets your most exacting requirements. Keyways cut $\frac{1}{8}$ " to 1" by broach having several teeth cutting at once; also eliminates tendency of cutter to dig into the work. Many other advantages!

Write for further data, it's free
SUNRAY COMPANY
P.O. BOX 445 • SPARTANBURG, S. C.

driver. 3. Because the stop is held in position by means outside of the collet itself, in the draw bar, practically the full length of the collet (4") may be utilized for the work piece. Thus the work piece is not limited to a length of 1 or 2 inches within the collet, as in the case of a stop which is also held within the collet. Furthermore, because the stop is held externally, there is no possibility of distorting the collet from internal pressure as can occur in holding the stop within the collet.

Production clamp

Simply installed, the M.E. production clamp, made by the M.E. Engineering Co., Dept. BB, 1158 N. Highland Ave., Los Angeles 38, Calif., is bolted to the machine bed or table, the holding arm adjusted to the required height and it is ready for service. The lever action applies holding pressure to the capacity



of the machine. No tools or wrenches are required to change parts during the production run. Special sizes can be made to specifications.

Automatic separators for clean compressed air

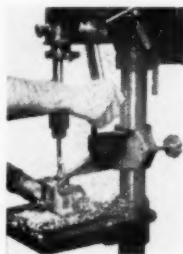
The line of automatic separators and drains manufactured by the Wilkerson Corp., Dept. BB, 1601 W. Girard Ave., Englewood, Colo., are said to efficiently strain all moisture and chemical properties in compressed air that cause rust and corrosion in air-operated production and cleaning tools. Longer life and better operation result from lines free of water, oil, rust, sludge, grit, dirt and

M.E. PRODUCTS HELP SPEED PRODUCTION

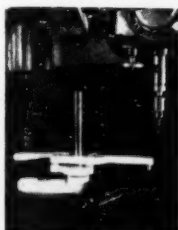
These accessories are needed in every shop. Pay for themselves over and over again. Send now for complete information.

M.E. DRILL CLAMP

For holding jigs, fixtures, work to be drilled, reamed, countersunk or otherwise machined on drill presses. Eliminates need for "C" clamps. Easily installed on the drill press column in 2 minutes, the M. E. Drill Clamp is always available; has safe, positive grip. Saves time and money.



M.E. PRODUCTION CLAMP



Now you can hold jigs and fixtures on the radial drill, production drill press, milling machine and jig borer . . . positively and accurately. Set-up hours formerly required for bolting jigs and fixtures can now be converted into productive hours. Safe . . . eliminates dangers of loosely held jigs. Installed in a matter of seconds!

M.E. DRILL GUIDE

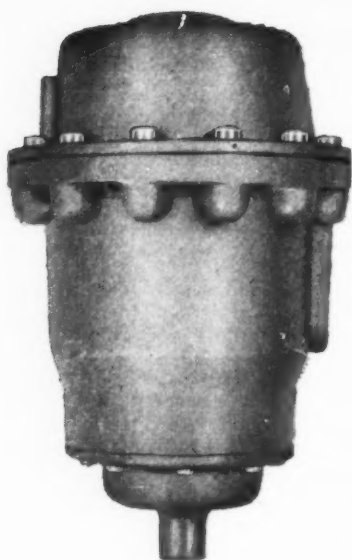
Accurate drilling of sheets, bars and castings which necessitate the use of a Drill bushing immediately above the work, is assured with the M.E. Drill Guide. No chatter.

Reduces drill and reamer breakage . . . eliminates "climbing" and distorted holes. This M. E. product and the others described above will increase efficiency in your shop.



Write today for full details and free helpful literature.

M.E. ENGINEERING COMPANY
1158 NORTH HIGHLAND AVENUE
LOS ANGELES 38, CALIFORNIA




other contaminants from air lines and tanks.


The illustration shows a diaphragm-operated valve to be placed downstream from the pressure regulator on each air line ahead of the tool. A feature of these units is the fact that they operate automatically.

Diamond salvage service

Industrial Diamond Powders, Inc., Dept. BB, P.O. Box 613, New Kensington, Pa., announce that they have complete facilities for handling all diamond salvage work. The firm pays either cash or graded pure diamond powder for diamond-bearing sludges, swarfs, used diamond wheels, and lapping wastes such as cotton. Diamond powder is graded according to the U.S. government system in grades 1 through 400. All material sent in is insured as soon as received. In addition, they also crush board and can supply all sizes up to 20 grit.



POWER REAMING MACHINE
 Will save many times its cost! Ideal for removing burrs after keyseating or tapping of set screw holes. Finish reaming speeded up with increased accuracy. Tedious hand reaming eliminated.



CATSKILL ABRASIVE CUT-OFF TOOL
 A rugged, compact unit for constant production. Cuts accurately a wide range of materials—readily adjustable to cutting of all non-ferrous metals and plastic. Safety and accuracy assured.

JOSEPH E. MURPHY CO.
 24 Ellsworth St. Worcester 3, Mass.

REDUCE DRILL BREAKAGE

... with full length bearing precision bushings, O.D. ground true to I.D. • We specialize in hole sizes #80 to $\frac{1}{2}$ ", in any body size. Other sizes to your specifications. Production small hole drilling, our specialty.

Write for catalog and quotations.

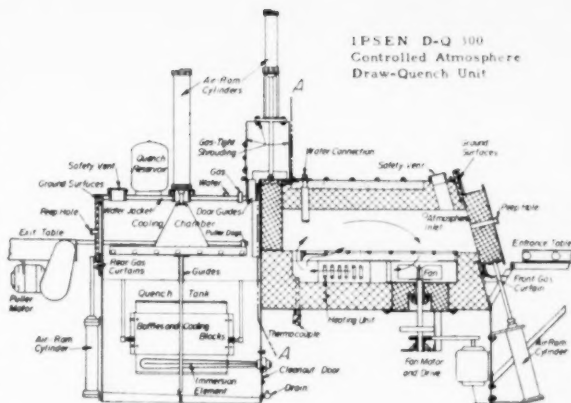
MICRO DRILL GUIDE
 AND ENGINEERING COMPANY • Detroit 35, Mich.
 P.O. Box 5184, Southfield Sta.

New draw quench unit

A new, combination draw - quench metal treating unit, designed for both bright, scale-free tempering and controlled oxidation tempering from 400° to 1400°, is announced by Ipsen Industries Inc., 719 S. Main St., Rockford, Ill. The D-Q 300 furnace is a fully automatic, sealed unit with the heating chamber separated from the combination cooling chamber and quench tank by a sealed inside door.

Controlled endothermic atmosphere is provided in both heating and cooling chambers. Parts being

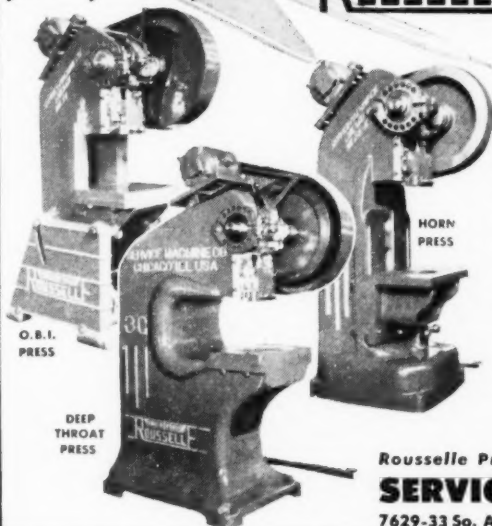
treated do not contact air at any time during tempering.



Men who had to "lick" the very problems you're facing designed...



ROUSSELLE PRESSES



That's why they're fast, accurate, so adaptable, so easy to operate. Why maintenance is simple. Why initial cost is low . . . Often considerable savings and improved punch press operations are possible if you let our engineering staff assist you. There is no obligation. Simply furnish the details relating to your need or problem and if possible send samples or drawings of the work. You will hear from us promptly.

Sold Exclusively Through Leading Machinery Dealers

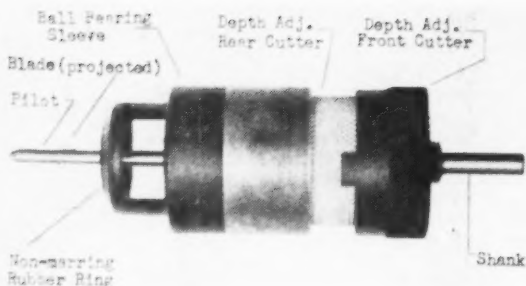
**Rousselle Presses are Manufactured by
SERVICE MACHINE CO.
7629-33 So. Ashland Ave., Chicago 20, Illinois**

Debursrs faces of drilled holes

Nobur Mfg. Co., Dept. BB, 717 N. Victory Blvd., Burbank, Calif., announces the new Nobur-matic tool for the simultaneous deburring or chamfering of both front and back faces of drilled holes in a simple, rapid operation, in sheet metal, plate, extrusion, casting, forging, etc., up to 5/16" thick.

The tool is used as a twist drill. It may be employed in a portable drill motor as in application to the deburring of rivet holes in aircraft frame structures, or it may be employed in a stationary machine tool such as a drill press, turret lathe, polishing lathe, etc.

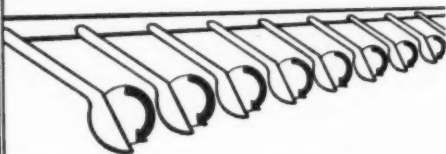
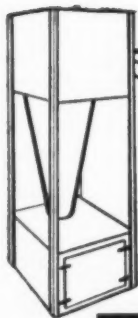
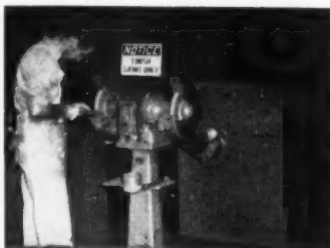
These tools are made in various pilot sizes corresponding to drill sizes. The cutting blade reclines within the pilot shaft during advance of the pilot into the work piece. As the sleeve contacts



the front face of the work it actuates projection of a cutting blade now positioned behind the work. Simultaneously, another cutting blade edge is brought into contact with the front or entry face of the work piece. The depth or extent of this cutting action is determined by the presetting of an adjustable stop nut. As the operator withdraws the tool, the projected rear side cutter contacts its work face and then retracts within the pilot as complete

STOP DUST

with **DUSTKOP**



Low cost, immediate control of dust from one remote dust source, or from a whole shop!

300 cfm to 10,000 cfm per unit (22 models) standard, pre-tested, available from stock. Ask for catalog 605-2. No obligation.

AGET-DETROIT CO.

205 MAIN ST.

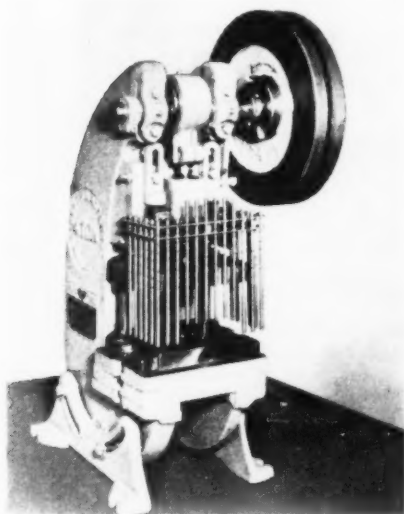
ANN ARBOR, MICH.

withdrawal of the tool is effected. The depth or extent of the back side cutting action is likewise preset by an adjustable pressure control nut.

Benchmaster universal punch press safety guard

The new Benchmaster barrier type punch press guard provides maximum operator safety regardless of die used without sacrificing press efficiency, it is claimed by the manufacturer, Benchmaster Mfg. Co., 1835 W. Rosecrans Ave., Dept. BB, Gardena, Calif.

Design is simple and flexible. By



dropping numerous vertical rods (the number depends on size of bolster plate) through any pair of prelocated holes in horizontal guard plates, a protective cage is set up around the die area. Virtually any shaped contour can be formed, it is said.

Douglas oil pump assembly machine

A semiautomatic, hopper fed, 8 station, oil pump assembly machine is announced by Douglas Tool Co., Dept. BB, 2300 E. Nine Mile Road, Hazel Park, Mich. A combination hydraulic and mechanical system actuates this machine. It is claimed that 280 pumps

**IT'S
FAR SUPERIOR**
COMPARISON PROVES IT



**DON'T BUY ANY AIR
GRINDER UNTIL YOU'VE GOT
THE FACTS ABOUT THE "M-B"**

UTILITY *Pneumatic* GRINDER

**MODEL U-TR
A 60,000 R.P.M. UNIT**

A powerful, fast-cutting tool, streamlined in design, easy to handle. Designed for real production work and the toughest jobs. Precision made, excellent balance. Special grease-sealed bearings . . . no lubrication required. Fitted with steel housing, a special safety feature.

Also Other Grinders and Automatic Air Line
Filters, Regulators and Lubricators.

"Remember, Built-in Quality Remains Long
After First-Cost Disappears"

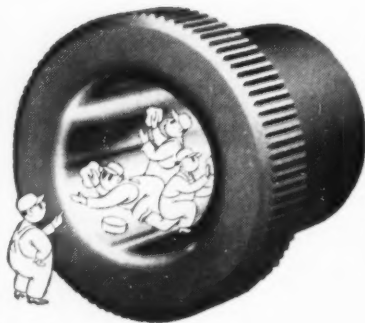
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M-B PRODUCTS
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SUPER FINISH OF UNIVERSAL DRILL BUSHINGS

**reduces tool wear
to a minimum**

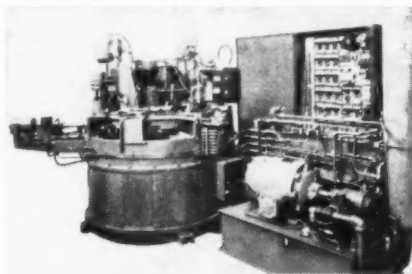


One sure way to cut excessive tool wear in your operations is to specify Universal Drill Bushings because their superfinish bores help reduce wear on production tools to an absolute minimum, especially in close tolerance work. The blended radius on the top inside diameter helps prevent tool hang-up and breakage. 100% concentricity and hardness tests insure accuracy, uniform high quality and long life. Knurled heads provide a quick, sure grip. Universal Drill Bushings are produced in a complete range of standard sizes and lengths. Orders for special dimensions will receive prompt attention. For complete information, write to the office nearest you—Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wis.—or our home office.

**UNIVERSAL
ENGINEERING COMPANY**
Frankenmuth 10, Michigan

171-B

can be assembled in one hour at 80% operating efficiency. There are three simple manual operations, each requiring one man. Pump bodies are loaded and finished assemblies are unloaded by one man. At station 1, the pump body is automatically clamped into place. Station 2 is an idle station. A hopper feeds in the idler gear shaft and presses this shaft into position at station 3. It is automatically checked for proper alignment at station 4 and is either accepted or rejected. Dowel pins are hopper fed into position and pressed in at station 5. An operator at station 6 inserts the idler gear, drive shaft and gear assembly, and puts a



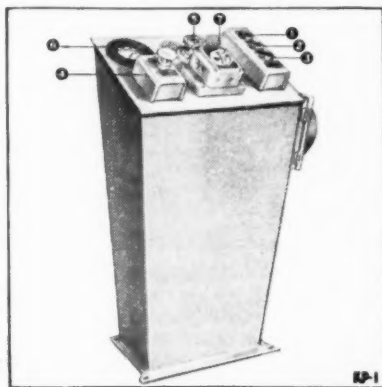
gasket into place. At station 7, the operator puts the cover on the oil pump and starts four cover screws. The cover screws and the pressure relief valve nut are automatically driven and torqued at station 8. When these operations are completed, the machine unclamps the oil pump and it is ready for removal by operator at station 1.

"Push-button" control stand now available for larger Kling friction saws

A new and improved method of operation for their larger friction saws is announced by Kling Bros. Eng. Works, Dept. BB, 1323 N. Kostner Ave., Chicago 51, Ill. "Push Button" control is now available for these saws on a central control stand.

All operations and feed adjustments are at the finger tips of the operator. When a button is pressed, coolant water is automatically sprayed on the saw

blade while the carriage moves the blade toward the work. The water is automatically shut off when a forward limit switch is struck, after the material has been cut. The same limit switch also causes the carriage to return to its



Location of the controls is as follows: 1. "Forward" Button. 2. "Reverse" Button. 3. "Stop" Button. 4. "Momentary Hold" Button. 5. Pressure Regulating Valve. 6. Pressure Gauge. 7. Flow Control Valve. original position. Safety buttons of "stop" and "reverse" are provided.

The new control stand is equipped with valves that adjust the feed pressure and the speed of the saw carriage. These adjustments were previously made at the side of the friction saw proper.

Marking and counting machine

The May Eng. Co., Dept. BB., 6055 Lankershim Blvd., North Hollywood, Calif., is introducing a machine for counting and marking at the same time; the device is called Mark-N-Count.

The pencil is used to check items or blueprints for estimating purposes. To mark and count certain items in production, taking inventory, checking lists, etc. An audible click registers each count.

The knob is turned for quickly re-setting to zero. The main advantage of using the machine is that concentration on the part of the user is not required.

June, 1953



**HORIZONTAL
or VERTICAL**

Model
"400"



**4"
ABRASIVE
BELT GRINDER**

Eliminate costly hand filing, grinding, deburring and many other operations . . . There are "101" applications for the 400 in your plant. Write for bulletin.

Hammond Machinery Builders

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Clamp it quick with RIK

\$49.50

Complete

clamping force
8 to 15 times
air pressure



only this end moves!

**The simplest air-controlled
vise ever built!**

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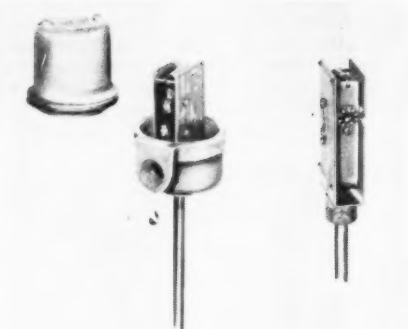
THE WILSON BOHANNAN CO.
DEPT. 20, MARION, OHIO

Differential expansion temperature control

A new small size temperature control, said to be suitable for laboratories, low temperature ovens, heating and air conditioning and other controlling between the limits of minus 300° F and plus 300° F is now being produced by the Burling Instrument Co., Dept. BB, 5 Vose Ave., South Orange, N.J.

It operates on the principle of differential expansion of solids and includes such features as snap-action electrical contacts, cast aluminum waterproof housing, easy temperature adjustability, and close operating differentials.

As in all other Burling controls, the temperature sensing element consists of a high expanding outer tube and a low expanding inner member. The relative motions of these, caused by temperature changes, is multiplied by a lever which actuates a microswitch. A dial graduated one to ten, together with an adjusting screw with pointer and a locking setscrew, are provided for changing



ing the temperature settings.

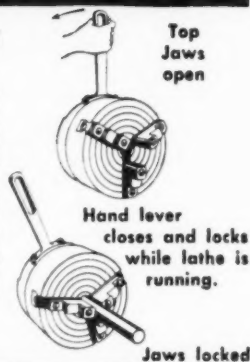
As long a tube as is practicable is used in the heated or cooled space, because this control operates by differential expansion of solids. Standard tube lengths are 5", 10" and 15" with the 10" length recommended for most applications. With the tube of brass and of this length, an operating differential of plus or minus 1/2° F can be obtained in most installations. The longer and

Labor Saving Production CHUCK

Will pay for itself in 60 to 90 days

On turrets, engine lathes, cutting-off machines, drill presses or any type of chucking machine, the Barker Two-Jaw or Three-Jaw hand operated chuck will increase production up to one third and actually pay for itself while doing it in from 60 to 90 days. Hand lever eliminates pneumatic and hydraulic systems, yet closes and locks jaws with lathe running or stopped. Over 30 years of labor saving, production boosting operation.

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Straighteners KNOW:
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 (Flexible Power)
STRAIGHTENING PRESSES
 • Operate easily
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Variable-Speed HI-LO PULLEY



Gives infinite variable speed with constant speed motors and any make of standard V-belt.

Maintains constant speed at any speed setting. Load carried by positive contact between cam and cam track, exclusive HI-LO feature.

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INFORMATION**

**EQUIPMENT
ENGINEERING CO.**

2851 Columbus
Minneapolis, Minnesota

read what
users say



about **CMD** anti-scoring lubricant

Among technical men all over the country, CMD has become the standard for extreme pressure, anti-scoring lubrication. These men have found that they can get more efficient lubrication for a longer time . . . and get longer life out of their equipment too. People who have used and tested CMD are your best proof of its reliability.

"We have tried out your CMD Anti-Scoring lubricants in both grease and oil in comparison with another brand claiming to be the world's best, for the purpose. We are happy to report that we have found your product superior in remaining in its protective position under sustained heavy loads for the longest periods of time of any material we have tried for this purpose."

Engineering Consultant

"Some time ago you very kindly sent to us some samples of your CMD Center Point Lubricants. These have been carefully tested in a number of applications besides the lubricating of centers, and we are pleased to say that the results have been very satisfactory even in cases where other well known high pressure lubricants have failed in a very short time."

University Dept. of Physics

Sample Kit Available for Your Trial

**CHICAGO MANUFACTURING
& DISTRIBUTING CO.**

1906 West 46th St.,
Chicago 9, Illinois

shorter tubes will decrease or increase this proportionally. Standard tube diameters are $\frac{3}{8}$ " and $\frac{1}{2}$ " o.d. Fittings for mounting the instruments are available with the $\frac{3}{8}$ " o.d. tubes.

The microswitch has snap-acting contacts rated by Underwriters Laboratories for 15 amperes, 125-250-460 volts, 60 cycles, a.c. Any one of three switch actions may be specified: normally closed (opens on temperature rise); normally open (closes on temperature rise); or single pole double throw.

Universal cleaning spray

Applied by a hand-sized pressure spray gun, patented Kelite Spray White is a new industrial cleaner now being marketed by Kelite Products Co., Dept. BB, 3401 W. Touhy Ave., Chicago 45, Ill. It is said to remove grease, oil, wax, gums, dirt, dye, ink, cutting soap, light carbon, etc., with complete safety to all metals, plastics, rubber, porcelain, composition, concrete or wood when used according to directions. It accomplishes rapid cleaning without heat, odor,



fumes, solvents, fire hazard or danger to skin.

Jobs are completed by spraying on and wiping off Spray White. The spray gun is charged with air pressure from any source, can be refilled in a few seconds and holds enough Spray White for several hours of average cleaning.

Permanent plate magnets

Claimed to be a more powerful, redesigned line of low-cost, nonelectric, permanent plate magnets for removing tramp iron from material carried in chutes, ducts, or on belts is now avail-

Beverly THROATLESS SHEAR

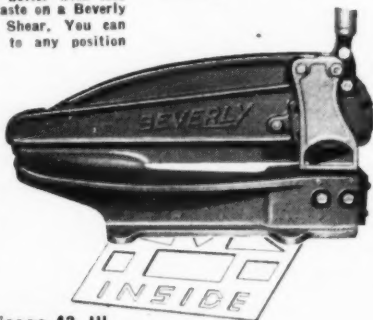
Cut any Shape... **STRAIGHT OR IRREGULAR**



B-3 with Ball Bearing Hold Down

Make any cut—curved, straight or irregular, faster, easier and better with less material waste on a Beverly Throatless Shear. You can turn work to any position

and make a clean cut as you go. Handles heavy gauges with ease—lighter metals without distortion. 4 models—capacities 18 gauge to 3/16" mild. All Shears equipped with H.C. H.C. Blades for cutting Stainless.



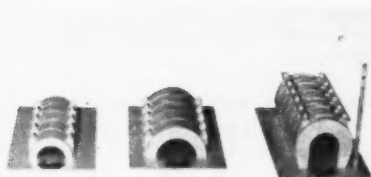
INSIDE SLOTTER

8" Reach — 16 ga. cap.

Makes inside slotting cutting faster, easier, cleaner. Punch and die arrangement of 5 blades assures accuracy, clean cutting action. Cuts $2\frac{1}{2}$ " x $\frac{1}{8}$ " slot at one stroke. Throat design permits pivoting work at any point in stroke for special inside cuts. Note sample cuts at left.

See your Beverly Dealer or write for illustrated catalog.

BEVERLY SHEAR MFG. CO., 3005 W. 111th ST., Chicago 43, Ill.



able in a complete range of sizes. The new models 1-H and 2-H Perma-Plate magnets made by Dings Magnetic Separator Co., Dept. BB, Milwaukee 46, Wis., are constructed of larger Alnico blocs of a new design, increasing their magnetic strength by as much as 50%. The new magnets are Mill Mutual approved for class A and class B installations. Their magnetic strength is certified and guaranteed for the mechanical life of the unit.

Micrometer adjustable spacing collars for cutter arbors

The Dayton Rogers Mfg. Co., Dept. BB, 2824 13th Ave. South, Minneapolis 7, Minn., announces new material in their micrometer adjustable spacing col-



lars for milling machine cutter arbors.

The new steel alloy introduced is said to give them greater accuracy on the micrometer screw threads, and makes it possible for the operator to clamp or tighten the milling machine nut arbor up to a given pressure of 20 tons without disturbing the micrometer accuracy of the cutter arbor ad-



Metal Cutting Saws ... by Reltool

Precision Made: Reltool Circular Saws of various types are made by modern precision methods of fine, high-speed tool steels. Hollow ground to required tolerances, they are slightly concave for ample clearance to assure free running in deep cuts.

A Reltool Saw for Every Need:

In addition to Plain Metal Slitting Saws, Reltool makes Metal Slitting Saws with Staggered Teeth and Side Clip Clearance, Screw Slotting Saws, Formed Tooth Saws, Fine and Coarse Tooth Tenacious Saws, Plastic Saws, and Circular Shears.

The RELTOOL Line Includes:

Combined Drill and Countersinks • Cut-off Blades • Die Sinking Cutters • Dovetail Cutters • End Mills • End Mill Holders • Hollow Mills • Key Seat Cutters • Lathe Centers • Lathe Mandrels • Machine Countersinks • Metal Slitting Saws • Milling Cutters — all types • Screw Slotters • Tool Bits • Specials.

Write for Reltool Net Price Catalog 53.



4540 W. BURNHAM ST. • MILWAUKEE 46, WIS.

A 7512-1/3



Zagar 1" collet holding fixture cuts costs in center drilling shafts.

take a short cut—
 depend upon
Zagar-
 holding and 
 indexing fixtures
 for milling, drilling,
 tapping and grinding

"Skip" the many special set-ups, jigs and fixtures formerly needed to hold and index. Maintain accuracy and close tolerances. No vertical movement in closing. Stop insures exact duplication of parts. Pipe tap hole provides for lubrication of cutting tools and washes out chips. Index any number of positions from 2 to 25 (4, 6 and 8 divisions standard). 1" and 2" sizes.

Write for Manual B-6.

ZAGAR TOOL, Inc., 24000 Lakeland Blvd.
Cleveland 23, O.

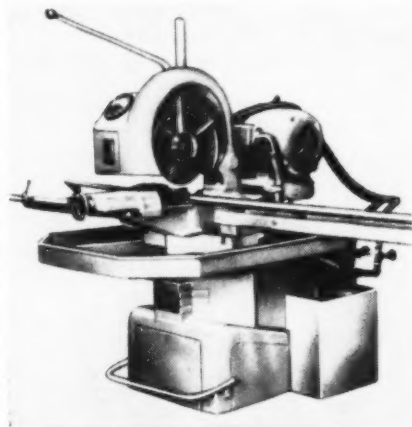
Zagar **TOOLS For**
INDUSTRY
and SPECIAL MACHINERY

justable spacers used in gang milling and other such milling machine operations.

Abrasive cut-off machines

The Ballinger division of Douglas Export-Import Corp., Dept. BB, 17 Battery Place, New York 4, N.Y., is introducing a newly developed line of cut-off machines in this country. They are said to be a completely new application of normal, wet cutting, bonded abrasive wheel cutters, and claim many new features.

A segment of the cutting wheel is encased in a removable housing which contains integrally cast radial vanes. The coolant is supplied by a normal coolant pump to each half of the housing guard. The rotation of the abrasive wheel builds up a water pressure between the faces of both wheel and guard efficiently cooling and affording



a definite measure of hydraulic stream. Another factor is the way the escaping abrasive grits sluice out a concavity on the rim of the wheel. This concavity tends to splay out under cutting pressure, cutting a kerf slot that is slightly wider than the thickness of the wheel. This results in cool, smooth cut surfaces, burr or fraze being almost absent, and slow even wear only on the rim of the cutting wheel.

Cutting speeds include: 3" dia. high

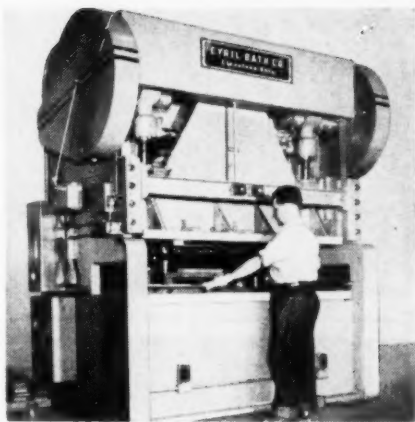
speed steel, 54 seconds; 3" x 6" bullet-proof glass, 90 seconds; 3" dia. x 2½" bore high speed steel, 12 seconds; 2½" nickel chrome bar, 23 seconds; ¾" boron carbide, 240 seconds; 9" x 3" U section steel channel, 58 seconds; 6" x 2½" bull head rails, 105 seconds.

Press type brake

The press type brake is a new press that is claimed to combine the principal functions of the press brake and the stamping press into one machine of greater versatility and speed. It is being manufactured by the Cyril Bath Co., Dept. BB, 6965 Machinery Ave., Cleveland 3, Ohio.

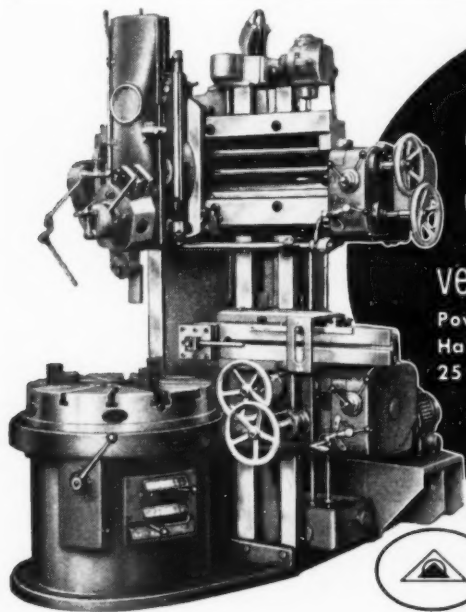
On the 30" wide bed, blanking, piercing, shallow draw, bending, trimming, etc., at a standard speed of 45 strokes per minute, or as high as 60 on fast light work, is claimed. Closed side housings, oversize slide areas, end feeding, a new direct-acting clutch-brake combination that needs no adjustment for wear are among the many outstanding features.

The ram and bed are mounted flush



with the face of the housing, eliminating the dangerous practice of reaching in under the ram, often necessary on larger presses.

This new Bath press type brake has a standard stroke of 5" and a shut height of 14" with a ram adjustment of 5".



36" WEWAG

vertical turret lathe

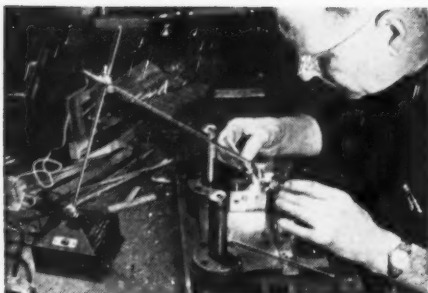
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TRIangle 5-2103 and 2157

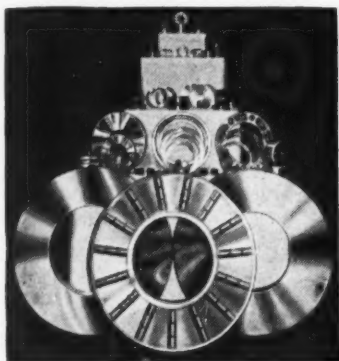


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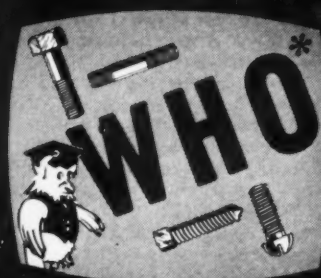


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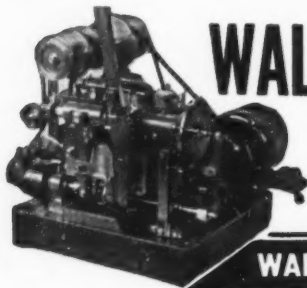
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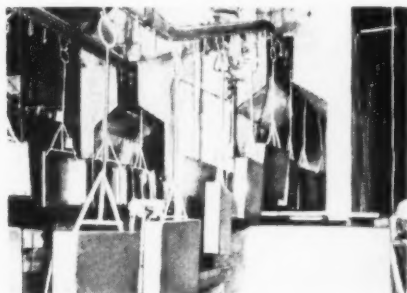
WALTHAM MACHINE WORKS

**WALTHAM 54
MASSACHUSETTS**

Continuous paint stripping from conveyor hooks

The stripping of paint from conveyor hooks, hangers and other conveyor line handline equipment, as well as paint rejects, is said to be possible by a new stepped up method. New paint stripping chemicals make it possible to make the job a regular production conveyor line operation.

Announcement of this new development is made by T. Curtis McKenzie, president of Klem Chemicals, Inc., Dept.



BB, 14401 Lanson Ave., Dearborn, Mich.

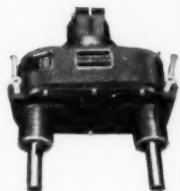
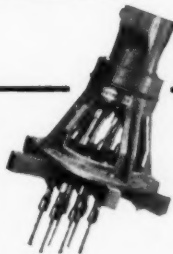
The procedure provides for running the conveyor line hangers, etc., through a tank of the one step stripper at a given point. Prior to reaching this stage, finished work pieces are removed and, at this point, accumulated paint rejects can be placed on the line to be stripped along with the equipment. The new high speed, one step stripper can also be applied by production spray methods if desired.

Multicontrol valve for general use

A new multicontrol hydraulic valve for farm machinery, road machinery, materials handling machinery, drilling machinery, mining machinery, industrial machinery, earth moving machinery, and many other applications has been developed and placed on the market by Gre-Sen Mfg. Co., Dept. BB, 628 Colfax Ave., Minneapolis, Minn., manufacturers of the Gre-Sen line of hydraulic pumps and valves. The new

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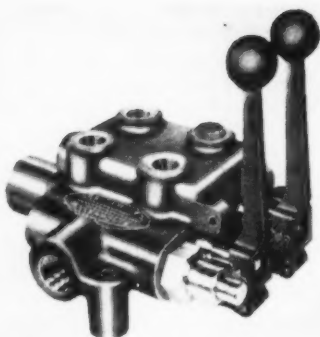


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INC.

19 Stewart St. Lynn, Massachusetts



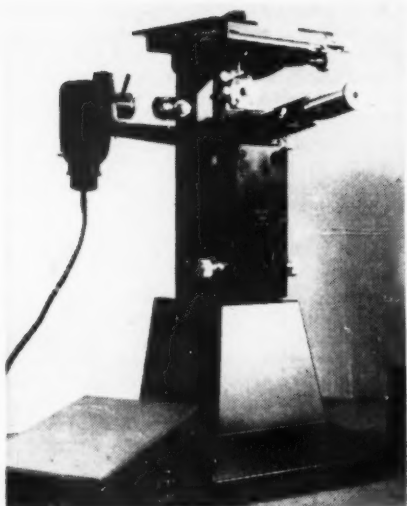
valve is for parallel applications. It is designed to actuate two double or single acting cylinders or a combination of one single and one double acting cylinder. Center sections are available, which make additional controls possible in any desired combination, it is said.

The high pressures within the valve are always equalized and balanced, thus preventing the unit from becoming locked in any position. The Gre-Sen Multi-Valve is fully balanced and self-centering, with built in relief valve, adjustable from pressures of 20 p.s.i. to 1250 p.s.i. This relief valve has replaceable hardened seat. The Multi-Valve has tripod mounting and hardened and chrome plated spools. Capacity is 24 g.p.m.

Inverted metallurgical microscope

Said to offer quick and convenient surface inspection of metallic specimens, William J. Hacker & Co., Inc., Dept. BB, 82 Beaver St., New York 5, N.Y., have introduced an inverted microscope.

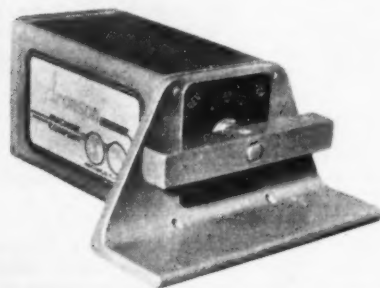
Some of the features claimed are: (1) large formidable base with shock absorbers to minimize vibration; (2) when placed on the stage the specimen is automatically aligned perpendicularly to optical axis; (3) square mechanical stage 15 x 15 cm. traversing in two directions with scales and verniers; (4) coarse focusing by rack and pinion, fine adjustment by micrometer screw with 0.001 mm measuring drum, scale for quick coarse focusing; (5) a low voltage lamp provides the illumination;



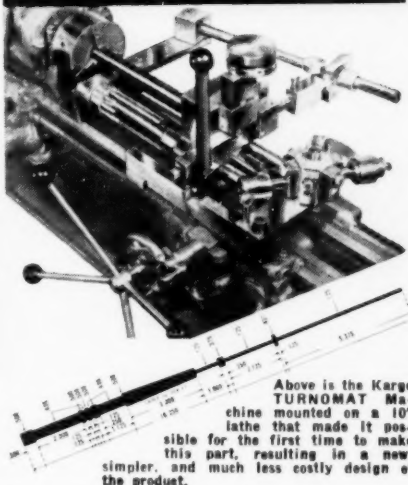
(6) optics for magnifications from 40 to 2200 times; (7) changeover from bright to dark ground illumination is instantaneous; (8) accessories include binocular eyepiece attachment, micro hardness tester, etc.

Foot power control

Aronson Machine Co., Dept. BB, Arcade, N.Y., manufacturer of welding positioners, announces its new model FPC foot power control, a reversing foot operated toggle switch. The switch is made up of Allen-Bradley Company's Bulletin 350 size 00 drum switch encased in an indestructible steel enclosure that is dust and oil tight. The



**you say "It's IMPOSSIBLE"
...well, here it is!**

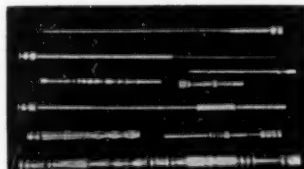


Above is the Karge TURNOMAT Machine mounted on a 10" lathe that made it possible for the first time to make this part, resulting in a new, simpler, and much less costly design of the product.

Here are the facts on this part: INSTRUMENT SPINDLE

Material—Stainless steel • Finish—16 micro inches Diameter tolerances + — .001 • Number of Diameters —14 • Number of pieces—2500 • Time—11 minutes, each • Set-up time—15 minutes, total • Tooling cost—\$11.25

Make us **prove** we can solve your problem, at **real savings for you**. Mail us your sample or blueprints; our engineers are eager to advise, recommend and quote you on the correct TURNOMAT equipment and tooling to give you increased production at lower cost. It costs you nothing to get the TURNOMAT facts — may save you thousands of dollars as it has other leading industries. Write today, Dept. B.



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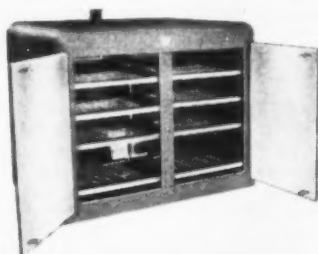
1825 S. 68TH ST., MILWAUKEE 14, WIS.

three pole switch has twelve terminals and will control single phase, two phase, three phase and direct current motors. The rating is $\frac{3}{4}$ h.p. for a.c. and $\frac{1}{8}$ h.p. for d.c. motors. Action can be either nonspring return (maintained contact) or self centering (momentary contact) changing from one to the other effected by relocation of one screw, easily accomplished in the field.

Eight compartment portable oven

Grieve-Hendrey Co., Inc., Dept. BB, 1815 W. Lake St., Chicago 12, Ill., announces the addition of an eight compartment unit, called Model PL 2A, to their line of portable electric ovens. The compartments allow for separation of different sizes or types of products while drying, baking or pre-heating.

One of the most prominent applications of this new oven is for moisture stabilization and storage of low hydrogen, stainless steel, hardenable steel and other welding electrodes. The recent

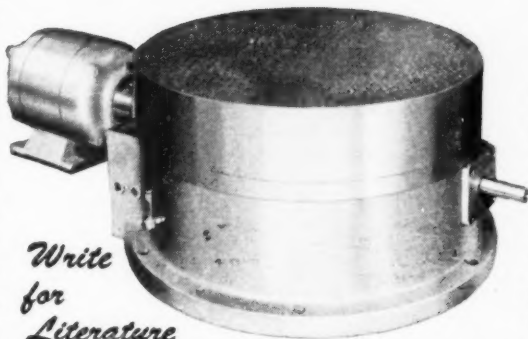


development of these new electrodes in the welding field require moisture stabilization to eliminate porosity, cracking and poor appearance of welds and for speeding up welding operations.

This oven claims low operating cost of less than 5 cents per hour; adjustable temperature control to 325° F; portability; operation from 110 volt ac outlet; fan driven forced circulation of air which forces moisture out; adjustable damper for control of temperature.

Size of oven is 30" wide x 25" deep x 24" high; inside is 28½" wide x 24" deep x 20½" high. Shelves are of expanded metal. Exterior is heavy gage steel, contour formed for strength.

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Complete Index Units have the new "Rim-Ball" table that will support enormous weight, and are made in 16" to 42" sizes for 3 to 12 indexes.

These units are all available for *quick delivery*. You can mount them on structures of your own to make practical and efficient production machine tools.

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**FAST METAL CUTTING
... MADE EASY!**

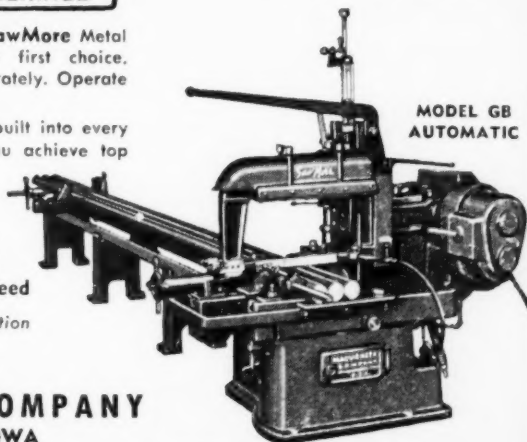
If it's speed you need . . . **SawMore** Metal Cutting Machines are your first choice. **SawMore** Machines cut accurately. Operate at lowest cost.

These highlight features—built into every **SawMore** Machine—help you achieve top production.

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AUTOMATIC**

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No matter what your investment in band sawing equipment, your choice of Blades governs the results. It's the blade, not the machine, that does the cutting.

That's why it's wise to choose MILFORD and know that you've picked the brand that's unsurpassed for efficient, productive metal cutting. Be it cut-off or contour sawing, even the best designed machine can deliver no more cutting than the blade that is used on it. When you pick MILFORD as the standard for your plant, you've protected your original investment and insured a machine-lifetime of efficient, productive performance.

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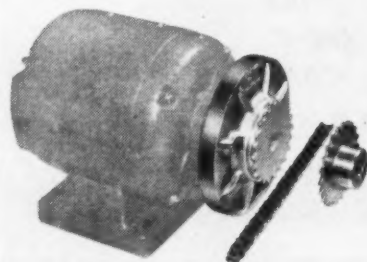
Buy MILFORD Blades through your local MILFORD DISTRIBUTOR - a man chosen for his ability and honest desire to serve for ALL YOUR INDUSTRIAL NEEDS

Fluid coupling

According to L. & S. Industries, Dept. BB, Box 577 Norwalk, Calif., any standard motor can be a fluid drive motor. Utilizing the new silicone fluids, and operating by a new principle, coupling is said to be compact, troubleproof and leakproof.

No larger in diameter than the standard motor and adding but $\frac{1}{4}$ " in length to the motor, the unit is furnished complete with flexible coupling for attaching to drive shaft or with V belt pulley.

It is said to be adaptable for crane or trolley drivers, conveyors, looms,



printing presses, etc., providing smooth acceleration for inertia loads, and preventing overload of motors and machinery.

Midget socket wrenches

Midget size socket wrenches and parts are the latest addition to the standard line of wrenches and shop tools offered by The Billings & Spencer Co., Dept. BB, Laurel Street, Hartford, Conn. The addition features a $\frac{1}{4}$ " square drive and rounds out the manufacturer's line of $\frac{3}{4}$ ", $\frac{1}{2}$ " and $\frac{3}{8}$ " square drive socket wrenches and parts. The new line is said to be designed especially for electronics technicians, carburetion specialists, electricians and others whose work requires the use of small size assembly and adjustment tools.

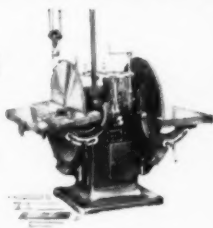
Sockets are available in six point (single hex) and eight point (double square) styles. Six point openings cover a size range from $\frac{3}{16}$ " to $\frac{7}{16}$ " inclusive. Eight point openings range from $\frac{1}{4}$ " to $\frac{3}{8}$ ". Parts and accessories



include such basics as sliding "T" handles, extensions, and adaptor. Also included among these is a small ratchet (reversible) and a wood handled screwdriver-type spinner.

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**NOLAN
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**Simple
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Extra Heavy Construction. Large Anti-Friction Spindle Takes American Std. No. 40 Arbors. Powerful: Takes motors up to 2 HP. Hand Lever, Screw or Automatic Table Feed

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Gaunt's hypodermic lubricating kit

A complete kit of lubricating and cementing tools made by Gaunt Industries, Dept. BB, 827 Irving Park Rd., Chicago 13, Ill., is said to be very use-



ful in the home, office, or factory for lubricating locks, squeaky doors, wall can openers, clocks, sewing machines,

typewriters and small parts of machinery of all kinds.

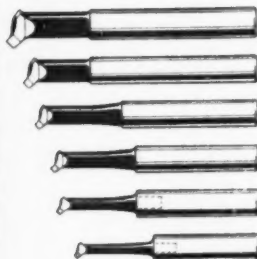
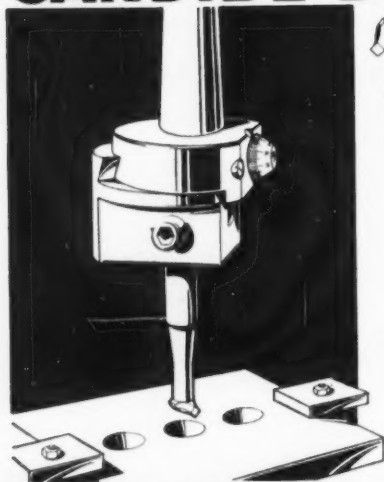
It consists of four items: Hypo-Oiler; pen size oiler with hypodermic needle and cap with pocket clip; Hypo-Jr., 2/3 the size of the Hypo-Oiler; Hypo-Lub, pen size grease gun with large needle, and Handy-Hypo adapter with hypodermic needle which may be screwed on tubes of cement, glue, grease or oil and for which a steel wire is supplied for preventing materials from drying in the bore.

Transfer screws, sets

The Heimann Mfg' Co., Urbana, O., has available for immediate shipment sizes No. 6 and 8 NC of its transfer screws and sets. A complete stock is carried at all times of all 14 NC sizes, No. 6 to 1 inch inclusive. Also in stock and available at all times for immediate shipment are the SAE or NF sizes No. 10 to 1 inch.

This tool is a threaded center punch used in leader pin die sets for locating open and blind threaded holes. Its use

CARBIDE BORING TOOLS



three
DISTINCTIVE STYLES

- for boring
- for facing & bottoming
- for internal threading

**ALL WITH
SOLID CARBIDE
HEADS**

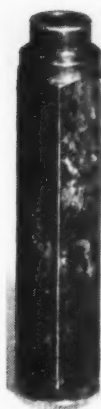
Most standard sizes in four popular carbide grades are

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784 No. Broadway
White Plains, N. Y.

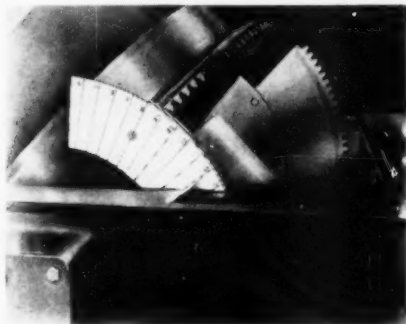


aids in definitely locating the die in proper relation to the punch on commercial die sets. The addition of the popular small sizes further extends the applications.

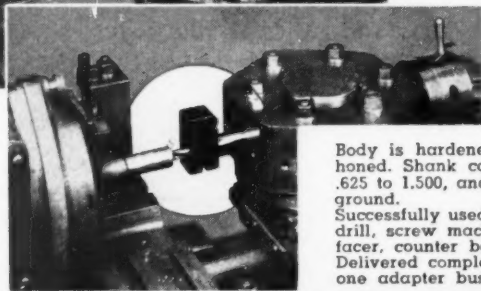
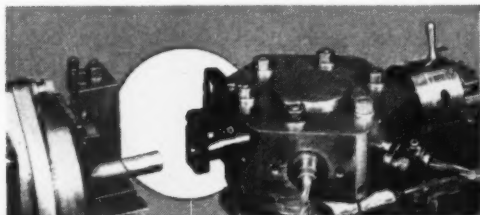
In each size the complete set consists of six hardened screws in a combined holder and wrench.

Protractor for welding

Aronson Machine Co., Dept. BB, Arcade, N.Y., manufacturers of welding positioners, announce an addition to their line of welding positioners. The Model PRO protractor is a quadrant marked off in degrees from 0 to 135 in 5° steps. The protractor is attached to



the tilt trunnion on the control side of the positioner where it is readily seen by the operator when tilting the table.



STOCK - STOP AND CENTER DRILL UNIT

**MORE
PRODUCTION
FROM YOUR
TURRET LATHE
\$22.50**

Body is hardened throughout, all holes line honed. Shank comes in five diameters, from .625 to 1.500, and ten lengths - hardened and ground.

Successfully used in conjunction with a center drill, screw machine drill, reamer, tap, spot-facer, counter bore, etc.

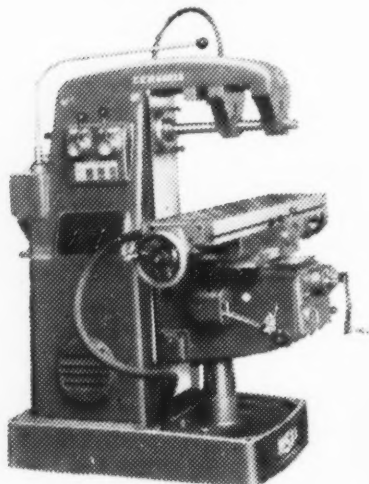
Delivered complete with one center drill and one adapter bushing.

INDUSTRIAL TOOL & SUPPLY CO.
2314 Stevens Creek Road, San Jose 28, California

CERVINIA

RAPID

UNIVERSAL MILLING MACHINE



SPECIFICATIONS:

Morse Taper NST No. 40—Working Surface 50"x10½"; Power Feed Range: Longitudinal 38"; Cross 8"; Vertical 15¾"; 8 Feeds: ½" to 6" per minute—Rapid Traverse 40" per minute 12 Spindle Speeds Range: 30 to 1000 rpm—Motor: 5 HP.

For further information write or call:

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Also available: Milling Machines, Shapers,
Engine Lathes, Drills.

Precise tilt angles are thus very easily obtained every time the table is tilted.

Welding research has shown that tilting the weld V downhill 10° results in over 50% increase in the weld speed. The PRO protractor facilitates positioning the work for this 50% increase with assurance of welding in the same attitude every time. The protractor can also be used when setting up, and when testing new weld processes and techniques.

Small impulse motor

A practical small electric impulse motor with variable speeds has been announced by General Die and Stamping Co., Dept. BB, 262 Mott St., New York 12, N.Y. Special patented features of this "Kasson Vibramotor" include low speed without gears and pinpoint stoppage the instant current is cut off.

Constructed entirely of steel with speed controlled by vernier adjustment, the Vibramotor has a mechanism that is said to be practically foolproof. The



unit is suitable for any application where reciprocating and rotating elements must stop dead at predetermined points. In the animated display field it eliminates solenoid mechanisms and permits efficient use of multiple pistons, resulting in many movements on one display. Other uses include mechanical toys, games, agitators, chemical and laboratory apparatus, alarm systems, electrical controls and many other similar applications.

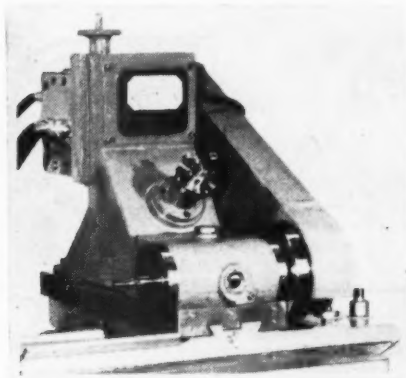
Model AV with a variable range one to 250 r.p.m. has a net weight of 1½ lbs. Dimensions are 2" x 4" x 5¼". The Vibramotor is also available geared, re-

ducing speed to a range of $\frac{1}{2}$ r.p.m. to 80 r.p.m. with greatly increased power. It is equipped with 4-foot cord and plug, and operates on 110 volts a.c., 60 cycles only.

Thread millers

Hanson-Whitney Division of the Whitney Chain Co., Dept. BB, Bartholomew Ave., Hartford, Conn., announces the addition of a new hydraulic group of thread milling machines to the company's line of precision machine tools. The new hydraulic machine will be offered in four sizes: 4" x 9", 10" x 24", 15" x 30", and 20" x 48", with bed lengths to meet customer requirements. Illustrated is the hydraulic head which is an outstanding feature of this all hydraulic machine.

Speeds are infinitely variable up to 3000 r.p.m. The unusual application of adjustable speed hydraulic motors to the cutter spindle drive and the work spindle drive permits a balancing of cutter speed and work feed, thus producing the best cutting condition for

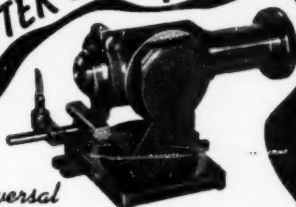


the material involved and permitting the use of carbide cutters where applicable. Adjustments are instantly possible during the operating cycle so that no time is wasted in finding the best spindle r.p.m. during setup.

Compound angle vise

A universal compound angle vise made by Combination Vise & Jig Co., Orfordville, Wis., is said to take the

NOW! A LOW-COST CUTTER GRINDING FIXTURE



The Universal

CUTTER GRINDING FIXTURE fits any universal tool or surface grinder. The basic unit, shown here (standard accessories not shown), with its four attachments, below, provide a quick and accurate answer to nearly all cutter and tool grinding demands.



Precision BALL END MILL

grinding is done with this compact, easily-operated fixture. An exceptionally flexible instrument, it grinds up to 2 1/4" dia., sets at any angles or radius with any cutting clearance on square, conical or ball nose shaped end mills.



◀ The MULTI-SWIVEL VISE attachment employs three swivels for quick set-up of any compound angle.



◀ This versatile INDEXING LOCK BRACKET may be set up in any position at either end of spindle housing on basic unit.



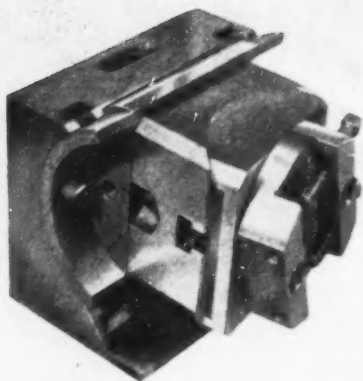
◀ For precision GRINDING WHEEL DRESSING this attachment will handle any two angles as well as set radius.

Send for descriptive literature.
Several good territories in U. S. and Canada are open to qualified representatives. Write:

**ROCHELEAU
TOOL AND DIE CO.**

650C No. Main St. Leominster, Mass.

Export Office: States Trading Co.
401 Broadway, New York 13, New York
Cable Address: STRADESO, N. Y.



place of both a vise and jig. No parallels are needed.

The subbase serves when making a compound on top of a compound tool, turned to the right or left depending on the angle. By checking the print to see if work is negative or positive, the correct degrees to move the subbase

is determined by the number of degrees represented by the difference in the two angles. For example, when a tool has 15° on the side and 20° on the end, the difference, of course, is 5° .

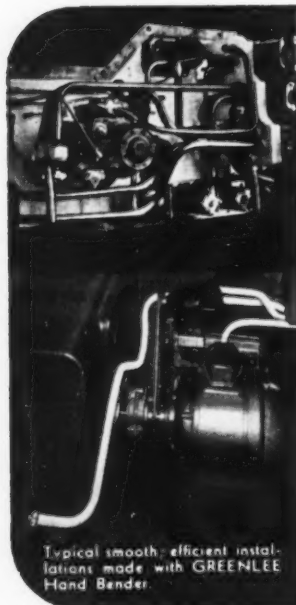
Mead cylinders and valves

Mead Specialties Co., Dept. CV-6, 4114 N. Knox Ave., Chicago, Ill., has added three new air clamps (spring return air cylinders and two new air valves) to its large line of air operated cylinders.

These are: Model H-71, power factor 7 times line pressure, stroke 1" and bore 3"; Model H-72, power factor 7 times line pressure, stroke 2" and bore 3"; Model H-73, power factor 7 times line pressure, stroke 3" and bore 3".

Model PC-101 air valve is the same as Model FT-101 except that in place of the lever there is only a button mounted directly on valve plunger, to be actuated by operator's palm or fist. Full 5/16" openings throughout. Hose nipples fit 3/8" i.d. hose.

The Model PC-1 is another variation



Typical smooth, efficient installations made with GREENLEE Hand Bender.

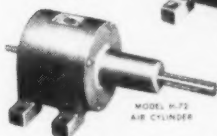
SMOOTH, accurate small-radius bends made quickly in pipe, tubing, conduit with Greenlee Hand Bender

Forming small-radius bends without flattening or kinks is simple, speedy work with a GREENLEE Hand Bender. Ideal in the shop for pipe and tubing installations on machines . . . especially designed to form neat bends for sharp corners, nooks and other close quarters. Various models and sizes for steel, copper, brass and aluminum tubing or pipe, rigid and thin-wall conduit. Write for facts. Greenlee Tool Co., 2006 Herbert Avenue, Rockford, Ill.

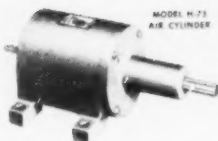


NEW MEAD AIR CLAMPS

(SPRING RETURN AIR
CYLINDERS)



MODEL H-73
AIR CYLINDER



MODEL H-71
AIR CYLINDER



MODEL H-71
AIR CYLINDER

NEW MEAD AIR VALVES



MODEL PC-101
AIR VALVE



MODEL PC-1
AIR VALVE

of Model FT-1. Ultra-compact and easy to mount, it is said to be quick acting with air cylinders up to 3" bore; for

larger cylinders use PC-101. Hose nipples fit 1/4" i.d. hose. With 1000 p.s.i. air line pressure, a force of approximately 10 lbs. is required to push the button.

Radial drilling machine 4' x 9" column x 1 1/4" capacity in mild steel

This British sensitive radial drill, distributed by International Machinery Div., Dept. BB, SR-2, 164 Duane St., New York 13, N.Y., has an arm that does not elevate, but can be swung 360° instead; the table is elevated and lowered and can also swing 360°. A one piece column can be used, thus giving more rigidity to the frame. This design places the table in the proper position for any small job. If greater capacity is desired, the table may be swung out of the way and the work mounted on the base.

As an alternative to the standard table, a swiveling table is furnished at extra cost.

The range of spindle speeds is 100

LAST WORD WHEEL DRESSERS Simplify the Job!

PRECISION ANGLE TANGENT TO RADIUS WHEEL DRESSING

- Dresses grinding wheel at point of contact.
- Shortens dressing time.
- Simplicity of setting.
- Rugged for long life.

Also Distributors of
SAMSON
OFFSET
BORING CHUCKS

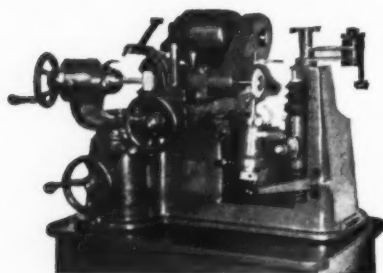


Above: These and countless other forms may be dressed simply with the Last Word Wheel Dresser. Write for Catalog

LAST WORD SALES CO.

18500 MT. ELLIOTT • DETROIT 34, MICHIGAN

HYBCO TAP GRINDER



MODEL 1100

**CHAMFER
Sharpening**



**FLUTE
Sharpening**

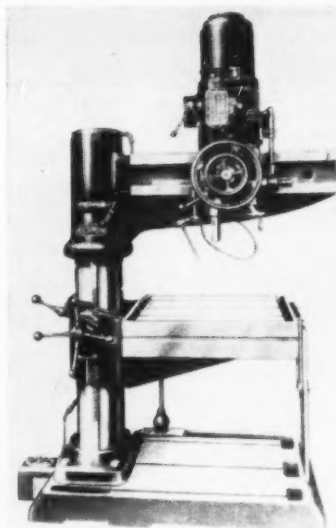


**GUN POINT
Sharpening**



- Capacities No. 0 Machine Screw to 1½" Hand Taps.

HENRY P. BOGGIS & CO.
710 East 163rd Street
Cleveland 10, Ohio



to 1,500 r.p.m. The number of feeds are three; the range is .005", .010" and .015"; the motor is 2 h.p. and the Morse taper is No. 3.

Counterbores, spot facers have interchangeable pilots

High speed counterbores and spot facers with interchangeable pilots have recently been added to the regular line of metal cutting tools manufactured by



the Butterfield Division of Union Twist Drill Co., Dept. BB, Derby Line, Vt.

Four styles of standard counterbores and spot facers are being manufactured. These are the long and short set in both straight and taper shank while two additional styles are made especially for

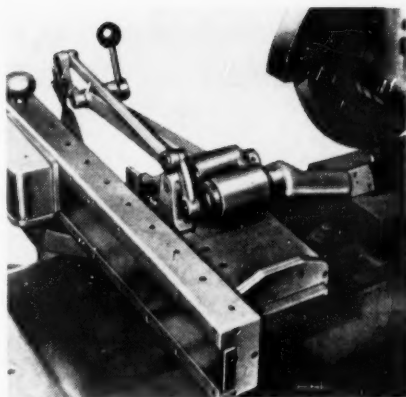
the aircraft industry, the long set and short set with $\frac{1}{4}$ " shank. The short set style with $\frac{1}{4}$ " shanks is designed for use with portable equipment such as hand drills.

To insure rigidity and permanent alignment all styles are made with the cutter and shank integral, with the cutting edges well backed.

Pilots are carefully ground from high grade alloy steel and are manufactured in two styles, one style for the standard counterbores and spot facers and another for the aircraft styles.

Hoglund universal contour wheel dresser

The KB11-3 Hoglund contour dresser will fit on any horizontal surface grinder and will dress up to 3" wide, 20" dia. wheels, according to the manufacturer, Hoglund Eng. & Mfg. Co., Dept. BB, 343 Snyder Ave., Berkley Heights, N.J. Other features claimed include: (1) accuracy to 0.0001"; (2) simple operation; (3) a lighter, more compact, and better balanced dresser without interfering overhang; (4) mag-



netic chuck mounting for short runs, permanent mounting at end of chuck for long runs. Its light weight (50 lb.) enables it to be moved from one machine to another, dressing different forms on each grinder by just changing the template; (5) dresses any contour, no matter how complex, that can be entered by the diamond.

#2 IMPERIA

universal tool
and cutter grinder

immediate delivery

Swing over table	10"
Distance between centers	20"
Surface of table	5" x 32"
4 spindle speeds, r.p.m.	2900 to 5800

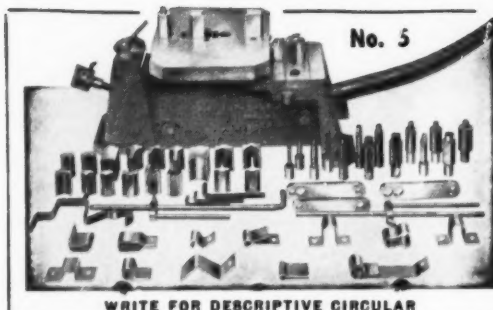
Thousands in use all over the world. Many in this country where they may be seen in operation.



Parker Machine Company, Inc.
158 Pioneer St., Brooklyn 31, N.Y.
TRiangle 5-2103 and 2157



write
or phone
for full
details



Multiform BENDER-CUTTER

CUTS, BENDS, PUNCHES

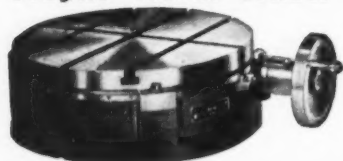
Available in hand or air operated models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to punch, bend and cut round or flat brass, bronze, aluminum, steel, etc., up to $\frac{3}{8}$ " x $1\frac{1}{2}$ " as illustrated, other models up to $\frac{1}{4}$ " x 4".

J. A. RICHARDS CO.
KALAMAZOO, MICH.

WRITE FOR DESCRIPTIVE CIRCULAR

NO MORE COSTLY JIGS

on small production jobs with
Troyke Worm Wheel Operated Tables



Size:

9 - 12 - 15 - 18 - 21 - 25

See your dealer or write
for Catalog No. 17.

Fully illustrated showing
all models and
applications to various
work.

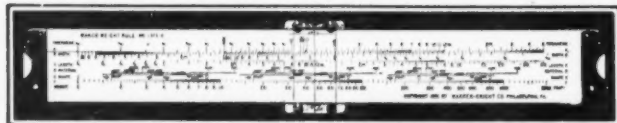


Drilling attachments can now
be furnished for Worm Wheel
Operated Tables.

TROYKE MFG. CO., Cincinnati 9, Ohio, U.S.A.

WAKCO WEIGHT SLIDE RULE Model 1373-D

This NEW Model includes decimal equivalent markings for U.S. Standard



Gauge plate sizes 8 to 22
in addition to basic weight
rule scales. Can now be
used as both weight and
general slide rule. Anyone
figuring sizes, shapes and
weights of steel, brass, cast
iron, lead, copper, alumi-
num or magnesium should
use this rule. For circular
write for MT 36, Pr. \$17.50

10 DAY TRIAL
No obligation to purchase

WARREN-KNIGHT CO.

136 North 12th St.
Philadelphia 7, Pa.

SPECIFICATIONS

Size 9"x16"

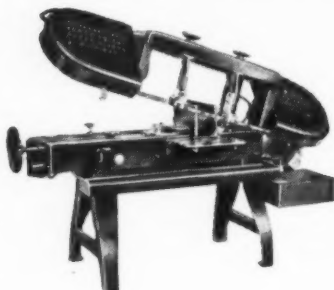
Blade Size $\frac{3}{4}$ "x.032x
11'6"

Floor Space 20"x66"

Blade Travel 60, 90
and 120 ft. per
minute

Swivel Vise 45 de-
grees in either
direction

Wt. Appr. 500 lbs.



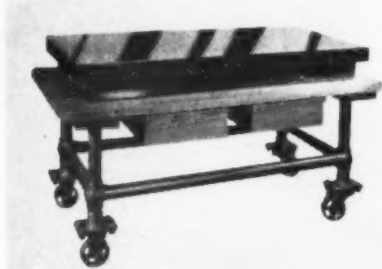
For BIG Savings at little cost

... investigate this new Model H
hinge-type saw, the economy model in
W. F. Wells & Sons' line of metal
cutting equipment. One-piece frame
lowers hydraulically. Coolant system
and other accessories available. Send
for literature today.

W. F. WELLS & SONS
THREE RIVERS, MICHIGAN

Portable Velsey granite surface plate

Designed particularly for the convenience of inspectors in tool rooms and close tolerance production plants, The Elkro Co., Dept. BB, 734 Albany St., Dayton, Ohio, has announced its



line of portable granite surface plates.

According to the manufacturer Velsey granite surface plates will retain their surface accuracy of .00005" or less over a period of years.

Among the advantages claimed for

the portable granite surface plates are: extreme accuracy, non magnetizing, non rusting, non warping, shock proof, non abrasive, greater than tool steel hardness, portability for convenience and multiple uses.

Truck mounted unit for strand flexible shaft machines

Franklin Balmar Corp., Dept. BB, N. A. Strand Div., Baltimore 11, Md., manufacturer of flexible shaft machines, has introduced a new type of portable mounting for its line of Strand flexible shaft machines.

The truck mount consists of a hand truck with wheeled rear axle and front skids. The flexible shaft unit itself is mounted on the deck of the truck in such a position that one operator can easily push the unit from place to place by merely pressing down on the handle to lift the front skids from the floor. The handle of the mount is equipped with a fixed clamp that holds the hand-piece and tool of the flexible shaft unit.

The equipment can be used as a fixed bench tool or a portable tool. The deck

STOP DUSTS INSTANTLY

with

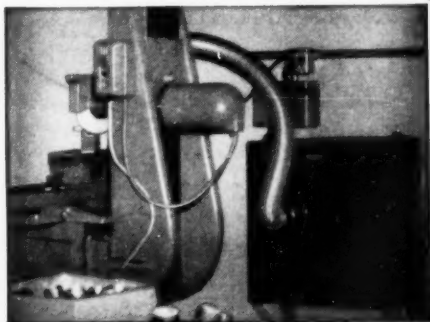
DUSTKOP

Available from stock of 22
standard models

300 cfm to 10,000 cfm

for: Surface Grinders, Tool and Cutter Grinders; Polishers and Buffers; Abrasive Belts and Discs; Woodworking and Plastic Industry Equipment . . . DUSTKOPS collect almost all kinds of industrial dusts.

Ask for Catalog 605-2. Describe dust problems for recommendation by return mail — no obligation.

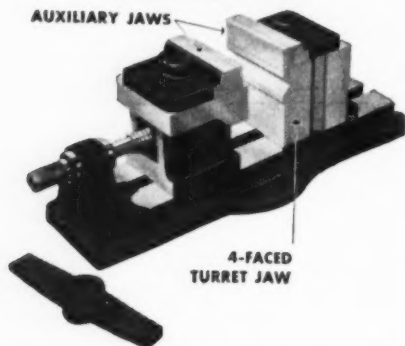


AGET-DETROIT CO.

502 Main St.

Ann Arbor, Michigan

SAVE SET-UP TIME



Holds round, oval, square, octagonal, rectangular, flat and angular work without special jigs.

Both men and machines put more time on productive work when Brown Vises are used because turret jaw faces and auxiliary jaws eliminate time wasted in "rigging" set-ups.

Quality is improved because husky vise (it weighs 96 lbs) holds work tight. Jaws open to 9½ inches. Clamping flange surrounds entire vise.

For complete specifications and prices write for Bulletin 23Y,
BROWN ENGINEERING CO.,
126 N. 3rd Street, Reading, Pa.

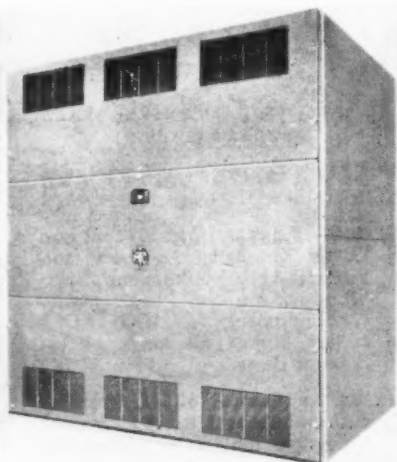
BROWN
UTILITY
VICES



of the truck itself is fitted with a metal box for carrying a complete set of tools and attachments along with the machine. The rear wheels of the truck are equipped with ball bearings and rubber tires to give smooth rolling even on rough flooring.

Transformer uses Mylar

First application of "Mylar" Polyester film in the transformer field is claimed by Marcus Transformer Co., Inc., Dept.



BB, Hillside, N.J.

The DuPont material, combined with Johns-Manville "Quinterra" and DuPont "Dacron" is being used in the Marcus transformers on Class B insulated magnet wire. Exhaustive tests are said to have demonstrated that the new insulation imparts exceptionally high heat resistance, and increases dielectric strength 10 times above conventional industry standards.

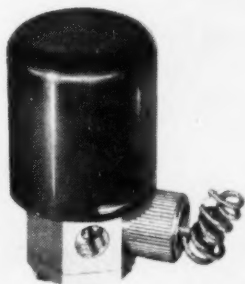
Solenoid air valves

Mechanical Air Controls, Inc., Dept. BB, 15311 W. 11 Mile Road, Detroit 37, Mich., announces the addition of the 1/4" No. 3500 series in-line solenoid operated air valves. They are available for straightway and 3 way application in both normally open and normally closed types.

Operation is by direct solenoid control. Reversal is by spring return. The conduit connection is separate from the cover to facilitate wiring. Ease of maintenance is a feature, as all parts are

accessible by the removal of two screws.

All types have a full 3/16" orifice area and are available from stock, in



any voltage and cycle requirement. Current requirements are 8/10 amps in-rush and 2/10 amps holding at 115 volt, 60 cycle. Recommended working pressure is from 20 to 150 p.s.i.

COOLEY HEAT TREATING FURNACES

ELECTRIC BOX TYPE • FLOOR AND BENCH MODELS

For Tools and Small Parts

SHOWN HERE

**THE COOLEY FLOOR MODEL
for HARDENING AND TEMPERING**



Max. Temp.	Sizes	Price
2000°	12" x 8" x 18"	\$1030
	12" x 8" x 24"	to
	12" x 8" x 36"	\$1485
	15" x 12" x 30"	

All prices are less controls. Any standard controls available for automatic temperature control.

- Cooley modern design provides natural convection—increases uniformity. Heavily insulated large area door makes for low heat loss—reduced power needs.
- Natural thermal convection.
- Easily removable heating elements.

Controlling Pyrometers carried in stock — available for all applications.

Free on request: ☐ COMPLETE CATALOG ☐ "SHOP NOTES ON HEAT TREATING"

COOLEY

ELECTRIC MANUFACTURING CORP.
36 SO. SHELBY • INDIANAPOLIS, IND.

HOT OFF THE PRESS
and



PNEUMATIC TOOL CATALOG



DRILLS



SCREWDRIVERS



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SAWS



POLISHERS

Yours free—the new, info-packed MALL catalog showing the very latest pneumatic tools available. It's a **MUST** for your reference file. Send for it today and get all the facts about the world-famous MALL line of completely modern pneumatic production tools . . . a size and style for every need.

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MU-23

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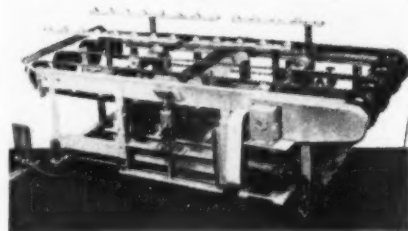
MALL TOOL COMPANY

7742 S. Chicago Ave., Chicago 19, Illinois

Strip, sheet handling machine

Introduction of a new sheet and strip handling machine to fill the increasing need of a device that can support long narrow strips as they are cut by the shear has been announced by the Fried Steel Equipment Mfg. Corp., Dept. BB, 528 East 119th Street, New York 35, N.Y.

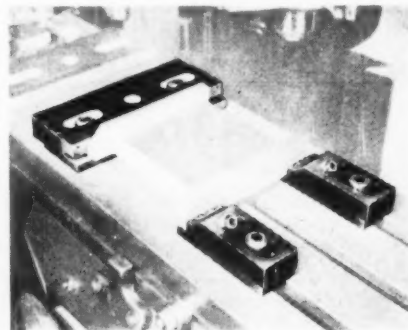
Called the Fried Coilveyor, it can handle strips up to 6' long and from 20" to 48" wide. After the ribbon comes off the coil it passes through the leveler and is then cut by the shear. At this point air operated plungers of the Coilveyor support the ribbon as it butts



against a stop acting as a back gage. As the shear cut is completed, the cut ribbon (or strip) is lowered to the conveyor belts and carried away. Plungers automatically return to support the next cut.

J & S double 1/2 vise

A hinged, spring-loaded jaw which is said to give positive down holding action in a new vise designed for quick accu-



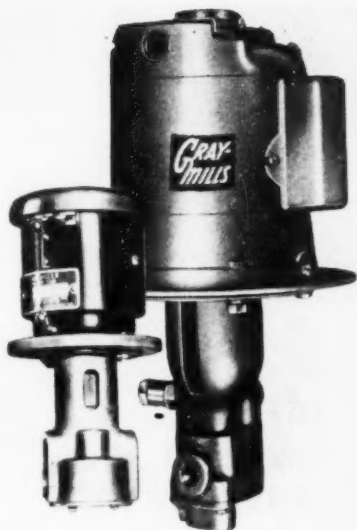
rate setups and rapid loading and unloading of jig borers, millers, planers and shapers has been announced by the J & S Tool Co., Inc., Dept. BB, 644 W. Mt. Pleasant Ave., Livingston, N.J. Called the "J & S double $\frac{1}{2}$ vise," it allows loading and unloading by simply loosening one adjusting screw on the opposing clamp.

Used in opposition with J & S jaw clamps, its hinged spring-loaded jaw secures workpieces rigidly to any machine tool. The hinged lip in-and-down action combined with the in-and-down action of the clamp holds the workpiece against the table with a force from $\frac{1}{2}$ to 3 tons.

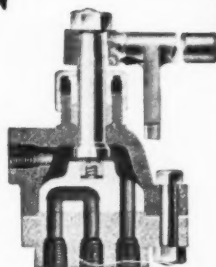
Small gear pump for 1/25 h.p. motor part of new line offered by Graymills Corp.

A new line of gear pumps from 1/25 h.p. to $\frac{1}{2}$ h.p. size has been introduced by Graymills Corp., Dept. BB, Evanston, Ill., manufacturers of portable coolant systems and pumps.

Three basic pump sizes are offered



This Large Processor Chooses Nicholson Valves for LONG WEAR



A large rubber firm reports that Nicholson cylinder control valves recently completed 10 years of constant use, without servicing, on an operation which had proved too much for other tested units. This report

further confirms that Nicholson valves, with their specially treated hard seats and non-corrosive lapping flat discs, become tighter with use. For air, gas, oil, steam, water in lever, foot, solenoid and motor types. Press., 300 to 5,000 lbs.

CAT'G.
552

117 Oregon St. Wilkes-Barre, Pa.

W. H.

NICHOLSON

& CO.

TRAPS · VALVES · FLOATS



*You Need an Extra Hand Now
to Speed Up Production!*

HEIMANN TRANSFER SCREW SETS

Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money tool

IN 11 SIZES—No. 6 to 1"
N.C. In all S.A.E. sizes.



HEIMANN MFG., CO. • URBANA, OHIO

GATCO ROTARY BUSHINGS

**FOR DRILLING,
CORE DRILLING
ROUGH AND
FINISHED
BORING**

The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work—or both. Eliminates expensive tool construction—Reduces tool wear—Prevents seizure and pilot breakage—Especially adapted where precision is required.

Write for full information and prices

GATCO ROTARY BUSHING CO.
42330 Ann Arbor Road U. S. 12
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MICRO FLAT

BLACK GRANITE SURFACE PLATES

Present an absolute continuous bearing surface, finished up to 50 millionths inch. Incredibly smooth. Falling objects do not cause humps. Being harder than

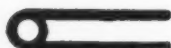
hardened steel, can take greatest mistreatment without causing inaccuracy of surface. No oiling. Will not rust or warp. No re-scraping. Most durable.

COLLINS MICROFLAT CO., 2326 E. 8TH ST., LOS ANGELES 21, CALIF.

PERFECT PRECISION

Avoid substitutes
Immediate delivery in most sizes from 9x12 to 48x144.

REQUEST BULLETIN
and name and address of
Distributor nearest you.



CLOSED

TRADE



CLOSED

MARK

Plain Type



Offset Type

CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

**THREE-FOURTHS
OFFSET**

**AUTO MOULDING
& MFG. CO.**

**1110 E. 87TH ST.
CHICAGO 19, ILL.**

SPECIFICATIONS:
Open width $\frac{7}{8}$ " to 6"
Gage Material .040 to .125
Pin Diameter .101 to $\frac{3}{16}$ "
Lengths to 120"

SEMI-OFFSET

for fluid delivery: 1 g.p.m., 2 g.p.m., and 3 g.p.m. Motor sizes are 1/25, 1/4, 1/8 and 1/2 h.p., with pressures to 100 p.s.i.

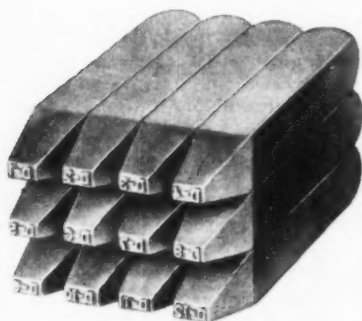
Designed for coolants, oils, solvents, emulsions; for machine tools, circulating systems, small sprayers, etc., these pump units are self-priming, directly connected to face mounted motors. Relief valve, inlet filter, and various mounting flanges are optional.

Compactness, and convenient mounting and positive alignment are features.

Steel date stamps

Steel date stamps to mark tools, assemblies, any product of any material with date of manufacture have been introduced by The Parker Stamp Works, Inc., Dept. BB, 650 Franklin Ave., Hartford, Conn.

Sets consist of 12 individual stamps,



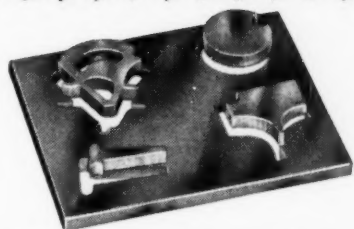
each bearing a key letter which changes annually and a number to indicate the month. Each stamp is constructed with deep cut letters to provide sharp, lasting impressions with a minimum of blow. Sets are available in 1/16", 1/8", and 3/16" character sizes.

Wendt-Sonis fly cutter

Greater economy and speed of production is said to be assured with universal fly cutters, manufactured by the Wendt-Sonis Co., Dept. BB, Hannibal, Mo.

Body slots are milled and finish ground to precision tolerances. Blades are also ground on both locating sides to assure an absolute minimum of total

Atlantic CONTOUR BANDS



BUILT STRONGER- TO LAST LONGER!

Intricate curves call for more than a blade of flawless precision — complex contour cutting requires a band saw of lasting STAMINA! Teeth of maximum hardness... strong, yet flexible, stock... correct heat treating — all are essential in producing a contour band that not only cuts — but keeps on cutting! Atlantic saws are the production-increasing result of advanced design, materials and technical skills — Atlantic "extras" that payoff in production with more work per blade!... slashed downtime!... increased output!

For 30 years Atlantic's facilities have been devoted exclusively to producing constantly improved blades. In the complete Atlantic line, there's a quality blade for every material, every job.

FREE!



Send today for the graphic story of Atlantic's family of fine saws. If you have a specific saw application you are wondering about, include a brief description — it will meet interested engineering attention and be promptly acknowledged.

Atlantic

ATLANTIC SAW MFG. COMPANY, Inc.
BREWERY STREET New Haven, Connecticut

THERE'S A STURDY
BURKE
FOR EVERY PURPOSE

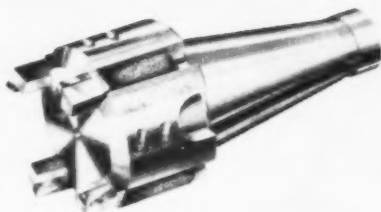
Thousands of efficient, low cost Burke Bench Millers are proving their superiority in Tool, Development and School Shops and a wide variety of mass production operations.



Send for complete data on models, attachments, accessories and suggestions for putting Burke's to work for your profit.

THE U. S. - BURKE
MACHINE TOOL DIV.

Brotherton Road 1, Cincinnati 27, Ohio



indicator runout when tool is in operation. Sizes for the fly cutters range from 3" to 6" and are available in 4 and 6 blade styles.

In the period from the end of World War II to early 1950, an average of approximately 400,000 persons per year earned Red Cross first aid certificates. From early 1950 (when civil defense began operations) to mid-1952, an average of about 1,000,000 persons per year were earning such certificates. The number of instructors in first aid tripled in that time.

SCHERR MAGNI-RAY



Oblique rays make scratches and defects stand out clearly.

Genuine optical glass lenses.

Heavy adjustable base.

Removable lens housing for inspection of large surfaces, engines, etc.

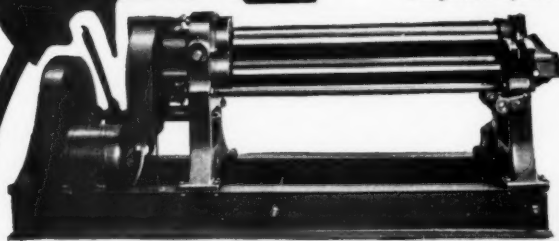
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COMPLETE LINE OF PRECISION INSTRUMENTS

200-MT LAFAYETTE ST. • N.Y. 12, N.Y.

BELOIT INITIAL TYPE BENDING ROLLS



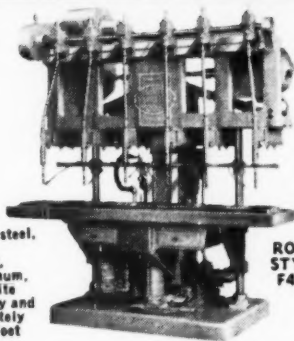
For quick forming of sheets and plates into cylindrical shapes, this type of Beloit-Bending Roll meets a long felt need in sheet metal and light plate working shops and plants. Well designed and strongly built for years of service. Easy to operate. Rolls are of slip type. Hinged housings permit speedy removal of completed cylinders . . . reversing lever places

equipment in readiness for the next piece of work. Two feed rolls are geared . . . third is idle but can be geared if desired. You can do the job easier with Beloit equipment. Send today for full information.

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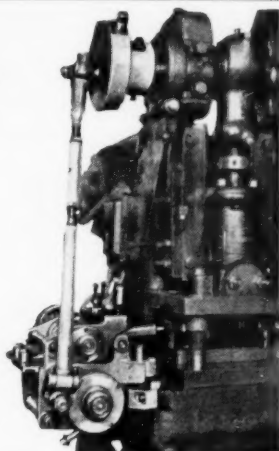
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Power feed machinery with adjustable spindles allows many jobs to be handled on one machine. Send sketches of drilling jobs for free estimate.

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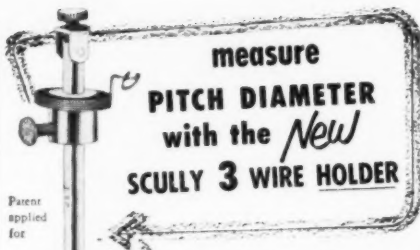
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measure
PITCH DIAMETER
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SCULLY 3 WIRE HOLDER

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Order direct: In-
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Set of 12 holders
with Mounting
Stand **\$40.00**
with wires **\$80.00**.



NO LOST TIME FUMBLING WITH LOOSE WIRES

The Scully 3 Wire Holder features a coil spring
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the single thread wire to assume the Helix angle
of the thread, and to maintain parallelism with the
double wires. . . measures up to 3" diameter with
standard wires. Each holder has accurately spaced
slots for one American Standard pitch only. 32, 28,
27, 24, 20, 18, 16, 14, 13, 12, 11, 10 threads
per inch.

SCULLY MACHINE COMPANY

62 WALTER STREET

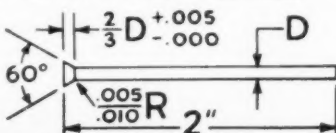
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**PERFORATING
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Save time, money, detail work. Use standard pre-
cision Perforating Punches—tough, durable, 57
Rc hard, with square, sharp cutting ends—for a
few cents apiece. Heads are annealed with plus
tolerance for finishing. 2" long in sizes up to
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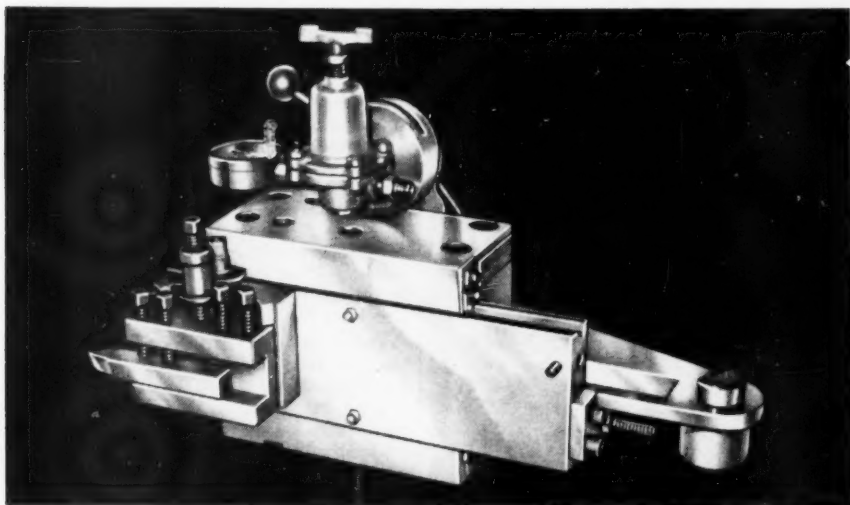
ROSS TOOL COMPANY

82 ST. PAUL STREET, ROCHESTER 4, N. Y.

**Campbell contour attachments for lathes and mills
now being distributed nationally**

Contour attachments for both lathes
and milling machines are announced

by Coquipco, Dept. BB, 236 S. Coronado,
Los Angeles 4, Calif., sole selling agents



*for greater RIGIDITY
more ACCURATE cuts*



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CRITERION

CRITERION
machine
WORKS

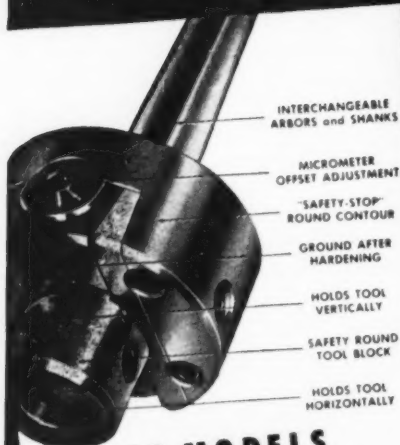
**BORING
HEADS**

A full line of adjustable boring heads and bars now available. Heads 1½" to 7" dia. Carbide or high speed bars ¾" to 1¾" dia. Lead screws ground AFTER HARDENING. Ample bearing surface, heat treated parts, interchangeable shanks. Criterion tools are the criterion. Write for free catalog and costs.

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FLYNN

**FOR 35 YEARS
THE LEADING NAME
IN BORING HEADS**



15 MODELS

Flynn has studied boring head applications for many years—builds a size and design for every job with all the wanted features. Machinists with real appreciation for quality and precision prefer Flynn.

**FLYNN
MANUFACTURING CO.**

133 Flowerdale
Ferndale 20, Mich.

Write for our catalog

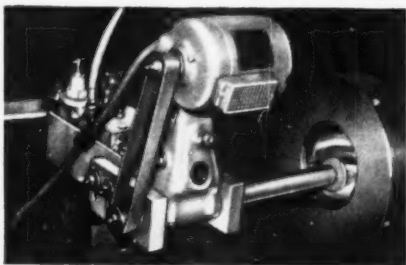


for the Campbell contour attachments. Dealers and sales representatives are being established in all the principal marketing areas in the United States.

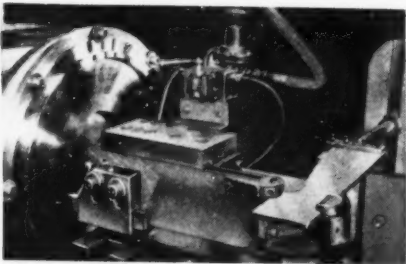
The Campbell contour attachment is said to be unique in several respects. The basic principle of this attachment is that it works opposite to the normal pattern of high-priced profile lathes and profile attachments, in that the pressure works against a hardened, ground template instead of the work piece. A unique 4-way air valve enables the air pressure to be reversed when required. The attachment can be set up or removed from an engine or turret lathe within an hour. There are only a few simple adjustments required to produce the first piece.

It is reputed to outperform many of the intricate copying lathes and copying attachments for difficult facing and heavy boring operations such as are required for parts in guided missiles and jet engines.

It is unnecessary to have a taper



attachment on the lathe. Many lathes are being purchased without taper attachments, for by using a contour attachment with a sign bar and Jo blocks, tapers to 45° can be obtained that will



repeat for any number of pieces. The device is doubly effective when doing taper threading and makes a positive thread pull out with a clean retraction on both taper threading and regular threading. The bigger the diameter and the tougher the material the more effective this procedure becomes.

The milling contour attachments have a superimposed table mounted on the regular mill table with an actuator at each end. The stylus is mounted on a bracket secured to the knee of the machine. It is unnecessary to disconnect any of the feeds, and one may go in one longitudinal direction taking a rough cut and return, taking a finished cut, by merely screwing in the cross-feed a few thousandths.

When used in conjunction with swivel heads of the Van Norman and Bridgeport type and/or rotary tables, an assortment of parts is produced that is limited only by the imagination and the fact one is working in the horizontal plane only.

Contour grinding has been done by

both the milling and lathe attachments by merely securing a spindle to the slide on the lathe attachment and by using a grinding spindle in the vertical head of the mill. Accuracies have been held to .0005 in 1" width on the milling machines, and on lathes limited only to the accuracy produced by the lathe itself. These can also be adapted to planers and vertical boring mills without change in the basic units.

Prosser carbide grinder

Thomas Prosser & Son, Dept. BB, 120 Wall St., New York, have announced the addition to their line of a new moderately priced wet grinder, the Model AW.

The Model AW embodies all of the features of the regular Model AA machine, including the quick acting indexing tables, which can be set to the required angle.

The machine is provided with a separate motor driven coolant pump, pan, settling tank, piping, valves, nozzles, and spray guards, and delivers a cop-

IMMEDIATE DELIVERY FROM STOCK

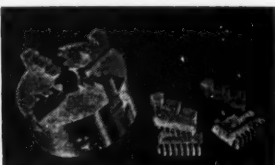


SELF CENTERING

Nickel Chrome Steel Pinions & Scroll, Semi-Steel Body, Universal Three Jaw, Two Sets of Jaws, Three Pinion

Model	Size	Wt. lbs.	Price
28	2 3/4"	2 1/2	\$ 25.00
29	3 1/4"	3 1/2	26.50
30	4"	6 1/2	30.00
30A	5"	11 1/4	37.50
31	6"	17 1/4	45.00
30BP*	4"	8 1/4	35.50
30ABP*	5"	15	42.50
31BP*	6"	21	50.00
52	7 1/2"	29	57.50
53	9"	43	67.50
54	10 1/2"	62	95.00
55	12"	88	125.00

BURNERD CHUCKS



GEARED SCROLL

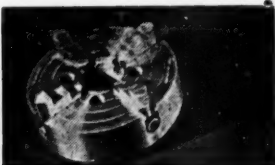
Universal Four Jaw, Two Sets of Jaws, Two Pinion

Model	Size	Wt. lbs.	Price
29Y	3 1/4"	3 3/4	\$ 30.00
30Y	4"	7	37.50
30AY	5"	12 1/2	43.50
31Y	6"	18 1/4	52.50
52Y	7 1/2"	29	65.00
53Y	9"	42	95.00
54Y	10 1/2"	62	110.00
55Y	12"	88	150.00
30AYBP*	5"	15 1/4	48.50
31YBP*	6"	22	57.50

Soft Jaws Available

Send for new catalog!

PRECISION BUILT MADE IN ENGLAND



LIGHT INDEPENDENT CHUCKS

Nickel Steel Operating Screws, Semi-Steel Body, Four Jaw Reversible, Hard Steel Jaws

Model	Size	Wt. lbs.	Price
35A	3 1/4"	2 3/4	\$ 12.50
35B	4"	4	14.00
35C	4 1/2"	5	18.50
34	6"	10	22.50
35BP*	4"	6 1/2	18.00
35CBP*	4 1/2"	7	22.50
34BP*	6"	14	26.50

Models marked with asterisk () are fitted with 1 1/2"-8 Back Plate for all popular 9" and 10" lathes.

DE WITT EQUIPMENT CO.

136 Lafayette St., New York 13, N.Y.

Telephone: WA 5-4048

KIPP
Air Grinders



- **FASTER SPEEDS**
- **BETTER RESULTS**
- **LOW PRICES**

MODEL JA
50,000 R.P.M.
Weight 12 ounces; length 6 1/4 inches; chuck size 1/8 inch. Wheel guard removed for better illustration.

\$42
IN U.S.A.

THEY GRIND—NOT JUST RUB!

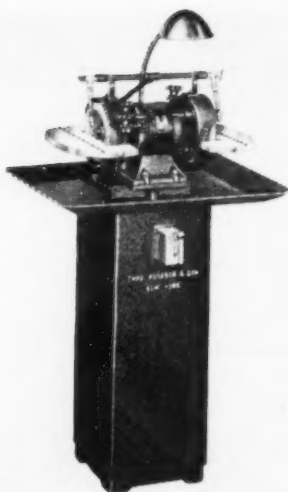
The RPM's stay up while grinding . . . not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind . . . not just rub. Every mechanic knows this, but an inexperienced buyer may order tools that maintain proper grinding speeds only when running idle. The speed of Kipp air grinders drops but slightly when put to work. That means better work . . . longer wheel life.

MADISON-KIPP CORP.

207 Waubesa St., Madison, Wis., U.S.A.

Write for KIPP Air Tool Catalog at 3006



ious flow of water directly to the tool being ground. Drum type on-off-reverse switch, combination protractor tool guide and truing tool holder, electric light, and brake, are also included.

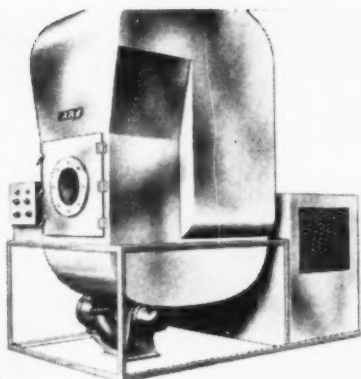
The new machine is furnished as standard with 1/2 h.p. motor for 110 volt, 60 cycle, single phase, or 220/440 volt, 60 cycle, 3 phase current. (In the latter machine the pump and light run at 110 volts.)

Development in dust, sand environmental testing

A new facility for sand and dust environmental testing has been announced by American Research Corp., Dept. BB, Bristol, Conn.

Engineering for the unit is said to be based on new concepts of streamlined air flow which have made it possible to lower the power necessary to move the air and reduce the floor space required while at the same time minimizing air side pressure drop. The facility is particularly designed to meet MIL-E-5272A and MIL-T-5422A.

Another new feature of this equipment is automatic temperature and dust density control which for the first time permits tests to be set up for long term runs without constant manual regulation. Air velocity is maintained constantly throughout the run at the

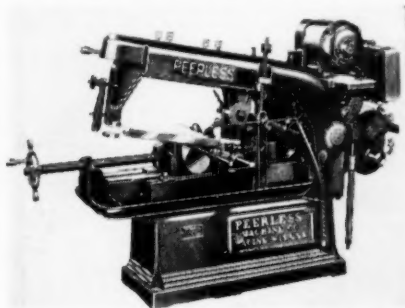


pre-set speed. Humidity indication is also provided for pre-conditioning the equipment and the facilities.

These units are now in production and are available in several sizes to meet various testing requirements. They are furnished complete with dust supply and necessary connections ready for installation.

Standard 10" by 10" metal cutting saw

A new product, the 10" by 10" standard model metal cutting saw to replace the 9" by 9" standard, has been an-



nounced by Peerless Machine Co., Dept. BB, 1600 Junction Ave., Racine, Wis.

The 10" by 10" is an overarm type with an open saw frame to permit loading from front or side for the general purpose work it is designed to handle.

767 STANDARD SIZES OF MARSHALL STEEL PRECISION GROUND FLAT STOCK

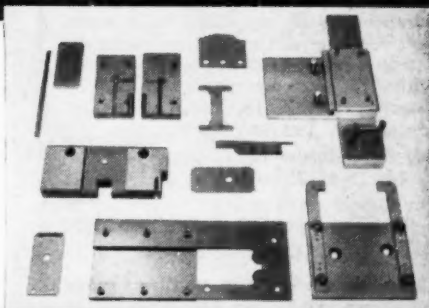
The world's largest range of sizes of precision ground tool steel in three grades are available, ready for immediate shipment and the layout bench.

WATERcrat: A fine grained electric furnace high carbon tool steel. It has been wet ground to remove all bad surfaces and to assure velvet finish of virgin metal.

OILcrat: An outstanding product of careful handling assures you of a fine grained electric furnace oil hardening ground flat stock ready for the layout bench.

AIRcrat: This air-hardening tool steel shows less size change and offers a greater safety in hardening than either of the other grades. Box 108-B

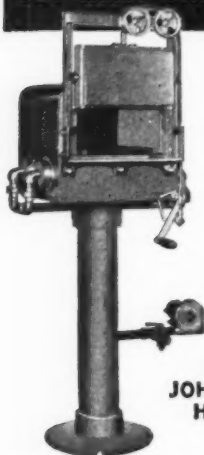
Write for descriptive literature, catalog of sizes and prices.



MARSHALL STEEL CO.
LA GRANGE, ILLINOIS

The Aristocrats of Ground Tool Steel

SAVE HOURS CUT HEAT TREATING COSTS



**Quick Acting
JOHNSON No. 130A
Hi-Speed Furnace**

Save time, save gas... heat treat carbon and high speed steels, dies and tools with JOHNSON 130A. Powerful burners provide fast uniform heat with time saving speed. Gets the job done while other furnaces are still warming up. Two sizes offer wide temperature range for any steels. Temperatures easily regulated with accuracy. Counterbalanced door opens upwards. Firebox 7"x13"x16 1/2" lined with high temperature refractory. Complete with Carbofrax Hearth, G. E. Motor and Johnson Blower.

**For temperature range
1400° to 2350°F-----\$295.00**

**For temperature range
1800° to 2400°F-----\$325.00**

F.O.B. Factory

Models available in smaller firebox sizes. Write for Free Catalog.

**JOHNSON GAS APPLIANCE CO.
570 E Ave. N.W., Cedar Rapids, Iowa**

**Since
1901**

**JOHNSON
FURNACES FOR INDUSTRY**

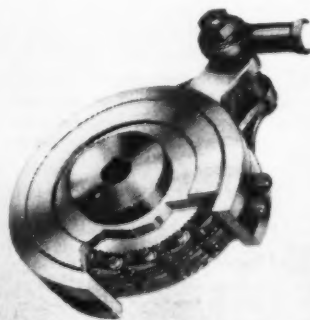
The overarm is much heavier than that of the tool it replaces and it carries and guides the saw frame, giving it the best possible control for a saw of this type, it is said.

Another new feature of the 10" by 10" is the heavy U-type saw frame. In addition to its heavier construction, this frame has wider shoulders than its predecessor assuring true alignment and consequently more accuracy. Those widened bearing shoulders add more rigid control of the saw blade, thus assuring sawing accuracy throughout the entire cut. The frame also has replaceable, hardened and ground steel bearing shoes which have been designed to answer the demand for a hack saw in this class with this improvement. With the new Peerless 10" by 10" a user can replace the bearings instead of replacing the entire saw frame. The work clamping vise is arranged to clamp work from 90° to 45°. The holding jaw is easily set at the desired angle and the clamping jaw adjusts itself automatically to the work.

A centrifugal force coolant pump assures proper coolant flow at all times without the danger of chip trouble or the inconvenience of breakdown caused by excessive gear wear.

Select-O-Matic indexer

The Durant Tool Supply Co., Dept. BB, 155 Orange St., Providence 3, R.I.,



is featuring the Select-O-Matic indexer that can be mounted in place of the conventional ratchet or friction clutch

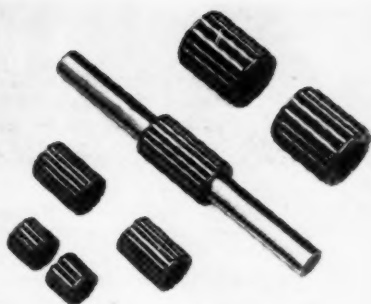
on power press roll feeds.

This indexer is said to incorporate a patented system of compound ratchets that makes a high degree of feeding accuracy possible. There is a possible 6,720 graduations on this unit and when attached to a roll feed with two inch dia. rolls will index the roll feed within .006". The multiple ratchet combination gives this unit the flexibility of a friction type feed.

The unit is completely enclosed and is sealed against dust and dirt. It comes in three different sizes, standard, heavy and extra heavy duty. The standard is said to take care of over 75% of all feeding requirements.

Inland making cage type roller bearings

A complete, new line of cage type roller bearings for slow moving machinery is now in production according to an announcement by Inland Automatic, Inc., Dept. B106, 1108 Jackson, Omaha 8, Neb., a subsidiary of Inland Manufacturing Co., also of Omaha.



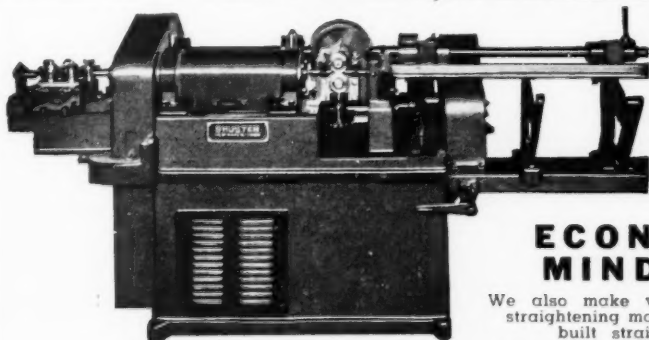
These bearings are suitable for most types of farm machinery, conveyors, farm wagons, wheel toys, material handling equipment, wheelbarrows and a host of other applications, the manufacturer claims. All components are statistically controlled for quality and precision in production, hydraulically assembled for uniform stress and individually inspected for i.d. and o.d. The company will also make special cage type bearings to specification.

SHUSTER

Automatic

Since 1866

**WIRE STRAIGHTENING
AND CUTTING MACHINES**



**Model 2AB
Automatic
Wire
Straightener
and Cut-off
Capacity
3/16" - 3/8"**

ECONOMY MINDED?

We also make wire reels, tube straightening machines, custom built straighteners.

Write for data on this SHUSTER "workhorse."

Representatives In All Principal Cities and In Foreign Countries

METTLER MACHINE TOOL, INC.
19 CONGRESS AVENUE NEW HAVEN, CONNECTICUT

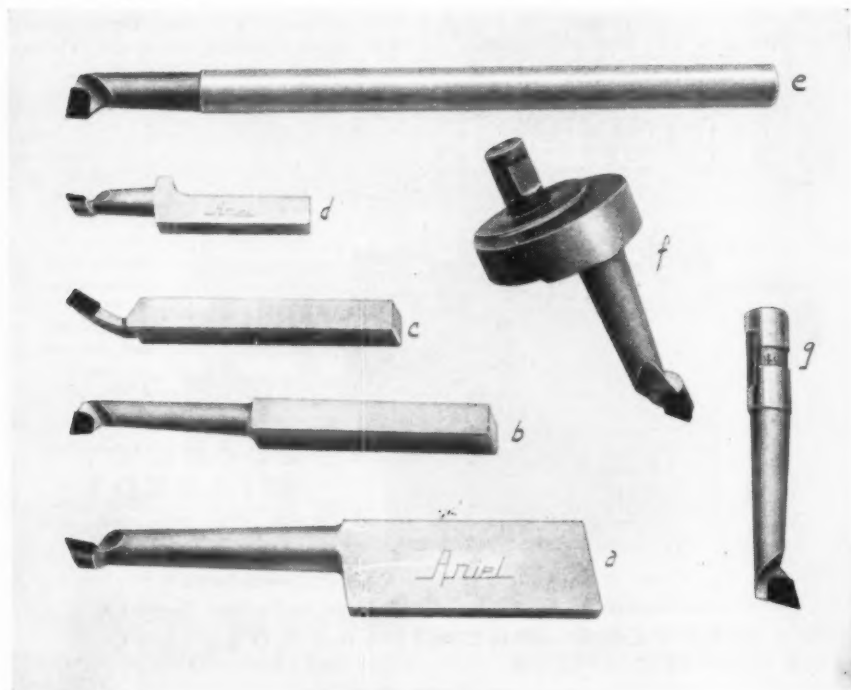
Better rigidity with new type boring tools

The Ariel Products Co., Dept. BB, 4050 W. 123rd St., Blue Island, Ill., is featuring new types of carbide tipped boring tools that are claimed to have many advantages.

Some of the features are: (1) one piece construction—the only wrench needed for this tool is a toolpost wrench; (2) rigidity—case hardened but retain-

ing a strong, soft core and being in one piece, it has more rigidity than a larger bar of two or more parts; (3) safe—it has a flat base from which to position it when hand grinding, which makes it easy to grind on any carbide grinder; no fixtures needed; (4) easier visual alignment—the back of the rectangular holder, the tapered shank and the tip holder are in a straight line; line this up with the machine and there's clear-

1. Reading from bottom left, clockwise: (a) boring tool to fit in lathe tool post for industrial use. Machined to a pre-determined center height. Stocked in eight sizes; (b) one of a line primarily for homecraft. This one shown is a grooving and cutoff tool. The quality is the same as the industrial grade and can also be used in tool rooms. It is external in application. There are five styles; (c) a boring tool for turret tool posts. Heretofore a square turning tool was altered, but since it wasn't designed for that purpose it was often costly and unsatisfactory. There are four sizes; (d) a conventional deep hole tool for engine lathes to fit in standard adapters; (e) an offset boring tool for jig boring heads that extends the boring capacity $2\frac{1}{4}$ " diametrically; (f) conventional jig boring tools; (g) special type tool.



STOP OILY FLOOR MISHAPS



with Tamms
DRY-IT
Natural or Calced
Fuller's Earth 10-44
mesh

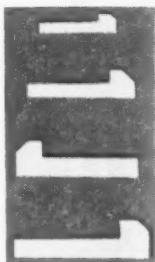
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Tamms Industries, Inc.
228 N. LaSalle St. Chicago 1, Ill.

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Yes, "Specify Standard" and you are certain of quality products to meet your production requirements. Your needs for the above items can best be served by Standard whose 2 plants (Beaver Falls, Pa. and Hammond, Indiana) are equipped to serve you. Write today for your free copy of Standard's catalog with specifications.



**STANDARD STEEL SPECIALTY
COMPANY**

BEAVER FALLS

PENNSYLVANIA



25,000,000 of these parts have been marked automatically on screw machines

NEW METHOD *Automatic* ROLL MARKER

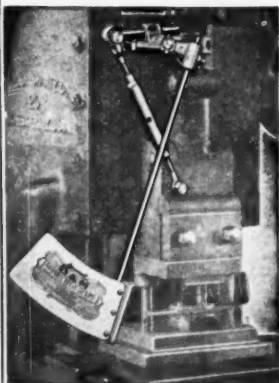
Designed for use on automatic screw-machines, lathes, etc., the New Method Model 500-C marker with its quick-interchangeable roll dies is practically fool-proof, saves time and money.

Eliminates
Separate
Marking
Operation

For further information ask for Bulletin NM 500-C.

NEW METHOD STEEL STAMPS, Inc.
149 Joseph Campau, Detroit 7, U.S.A.

D & M AUTOMATIC PRESS GUARD

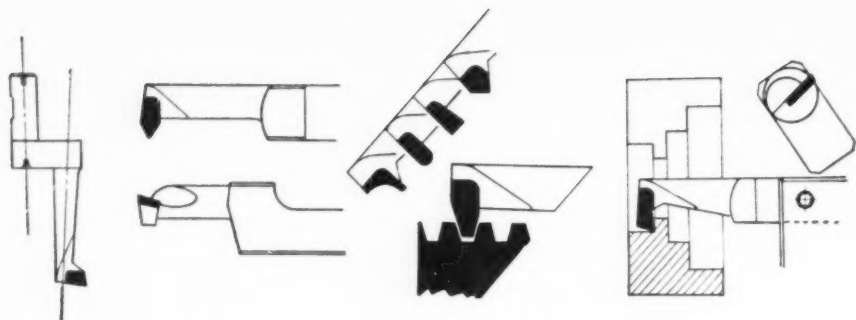


- No Springs
-
- No Cables
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- Fits Any Machine
-
- Low Initial Cost
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• This punch press guard meets the most exacting standards of safety engineers and safety laws. Permits operator to feed the press without hindrance.

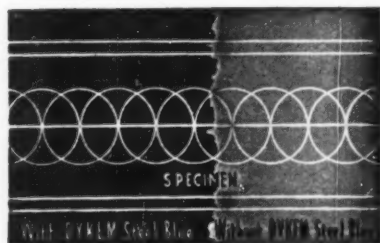
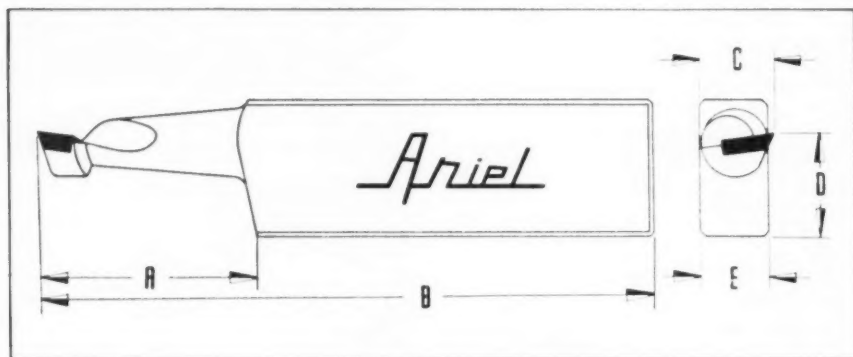
Write for complete information.
Immediate Delivery

D & M GUARD Co.
897 Military Rd. Buffalo, New York



ance for the entire bar's length; (5) correct center height—the tool is built to specifications of the buyer; grinding should be from the front and sides, maintaining the correct rake; (6) custom made—the grade and make of car-

bide can be specified; the tools are made in sets and housed in a wooden box to prevent chipping. Carbide tipped boring tools of special shapes or sizes can be supplied including jig boring tools.



DYKEM STEEL BLUE

Stops Losses in Making Dies and Templates

Simply brush on, right at the bench, ready for the lay-out in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information.

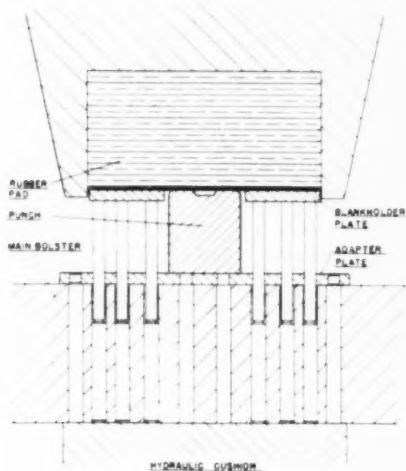
THE DYKEM COMPANY

2301G North 11th St.

St. Louis 6, Mo.

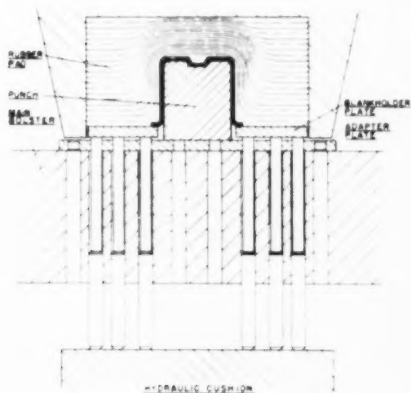
First commercial press for Hidraw

Representatives of major aircraft manufacturers recently gathered at The Hydraulic Press Mfg. Co., Dept. BB, Mount Gilead, Ohio, to watch a demonstration of the first commercial press



built for Hidraw—a new method for deep drawing metal parts by a combination cushion and rubber pad process.

The Hidraw process was developed



June, 1953



FOR PRECISION GROOVING, RECESSING AND BACKFACING

Versatile MAXWELL recessing tools can be used on any drill press, boring mill, turret lathe, radial drill or milling machine. Ball-bearing pilots and high speed or carbide cutters are interchangeable to handle any job within range of holders.

MAXWELL recessing tools are precision built for sustained accuracy in production runs . . . yet take cuts at unusually high feeds. 4 sizes available for $\frac{3}{8}$ to 4-inch holes.

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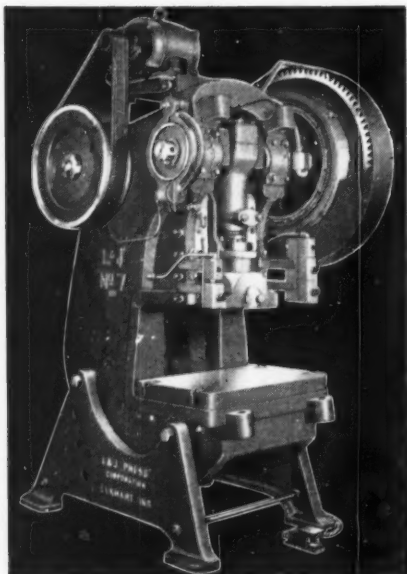
1056-MC

**THE MAXWELL
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220 Broadway • Bedford, Ohio

L & J PRESSES

for Low-Cost Output



The exceptional rigidity and accuracy built into L & J No. 7 Presses is proven by their productivity. Close tolerance work can be consistently produced, longer die life results from proper alignment and minimum deflection. Users report down time and maintenance surprisingly low. Find out now how they can improve the quality and volume of your press work at reduced costs. Available in back-gear and plain flywheel types. Also with positive clutch.

Write for Literature



and perfected on a two-year production basis by Consolidated Vultee Aircraft Corp. of Ft. Worth, Tex. After proving its merits along with lower production costs, Convair came to H-P-M for assistance in building the 7000-ton production size machine that is shown being demonstrated.

Advantages of the Hidraw process are claimed to be as follows: (1) Perfect surface finish of part due to the fact that the part is in contact with rubber and male portion of die only while the draw operation is being performed. (2) Uniform thickness, and minimum stretching, because the part is formed by fluid pressure and is not subjected to an ironing operation. (3) Parts with contour difficult to form can be formed straight from the blank to the finished part since the rubber acts as a fluid pressure medium and there is no unsupported metal between the point of contact with the punch and the actual draw ring itself. (4) Inexpensive tooling, especially where there are thousands of parts and small production lots. (5) Elimination of expensive hand work in removing wrinkles encountered in the Guerin operation. (6) Parts produced by the drop hammer method and which require highly skilled operators can be produced by unskilled operators by the Hidraw process.

At the start of the draw, a blank is placed on the blankholder plate which is flush with the top of the punch. The main platen descends to the work and at the point of contact with the blank, the platen automatically slows down to prevent deforming the blank by high speed contact. The platen continues to descend, generating pressure in the rubber pad which grips the blank between the face of the pad and the blankholder ring. The exact pressure generated in the pad is determined by the pressure developed in the hydraulic cushion in the press bed which in turn supports the blankholder ring on pins extending through the press bolster plate.

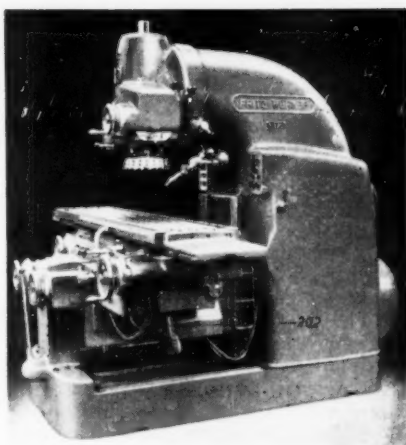
The pressure generated in the rubber pad forces the blank down over the punch to assume the contour of the punch.

Werner vertical millers

Werner vertical millers, No. 5 and No. 6, distributed by Marac Machinery Corp., Dept. BB, 1819 Broadway, New York 23, N.Y., are said to be of new construction that lends them to mass production as well as toolroom.

Preselectors for feeds and speeds allow pushbutton selection of any of 42 speeds and 50 feeds. Speeds range from 16-1800 r.p.m. and feeds from 3/16 to 80" per minute. Of interest is the method of selecting speeds and feeds. Hydraulic cylinders operated by solenoid valves shift the gear clusters. Limit switches are so arranged that the spindle cannot be restarted until the preselected speed has been correctly engaged. During the shifting operation the gears revolve slowly in order to insure accurate and smooth engagement of the hardened and ground gears.

The feed changes take place by electro-magnetic clutches. A total of eleven clutches select 50 feeds in groups of four. A new feed can be selected



at any time and engaged while the machine is cutting.

Other important new features on this machine are the automatic rise and fall device; automatic table clamping and unclamping; permanent visual indica-

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Our
machine
carries the
Butterfly
trade
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Registered
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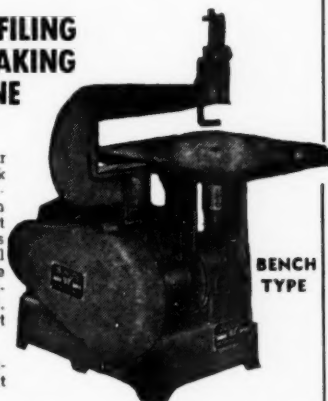
TO INCREASE PRODUCTION TO IMPROVE EFFICIENCY

USE BUTTERFLY FILING AND DIE MAKING MACHINE

MOUNTED
ON
PEDESTAL

This is a powerful machine for heavy or small precision work in use all over the world: Airplane Factories, Ammunition Plants, Toolrooms where fast production is desired. 4 Models No. 16, No. 14, "EL" and Model "D". The larger the model, the larger the stroke and therefore more filing is performed. Furnished with or without pedestals.

Constructed as per Specification of U. S. Naval Aircraft Factories.



BENCH
TYPE

HARVEY MFG. CORP.

Dept. H, 161 Grand St., New York Phone: CAnal 6-5170

tions of the feeds, speeds, and directions of traverse set into the machine; automatic spindle lubrication, built-in climb milling device.

At the end of the feed stroke the table will automatically fall 2". At the end of the rapid return the table will automatically rise 2" back to the working position. For single piece work the rise and fall, and rapid traverses can either be controlled manually or switched off entirely.

All three motions of the table are always clamped automatically by electro-hydraulic clamps. As soon as a feed is engaged the clamp in that particular direction is released automatically.

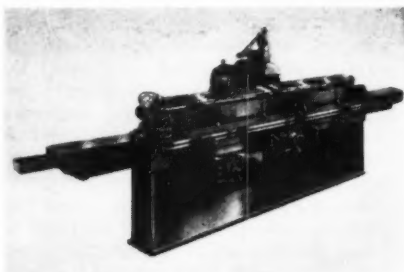
These machines are built on the unit construction principle so that maintenance is extremely easy. The electrical and hydraulic equipment is entirely enclosed within the column of the machine. Emergency switches, overload and no voltage protection is furnished. All motors are enclosed and are specially built for use in the United States on 220/440 volt, 3 phase, 60

cycles. A 50 h.p. motor can be furnished as optional equipment.

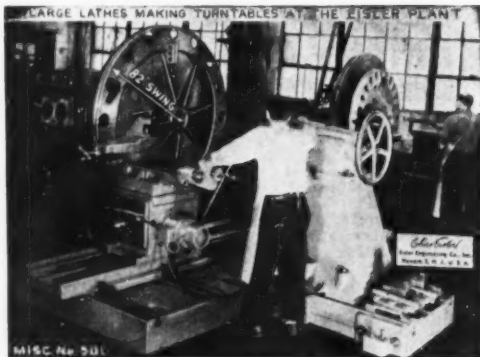
The No. 5 Miller has a table of 90" x 19½" and a longitudinal traverse of 55". The No. 6 Miller has a table of 110" x 19½". A plain milling machine of similar dimensions is also available.

Knife grinder, with automatic table drive transmission, by Hanchett

The Hanchett Mfg. Co., Dept. BB, Big Rapids, Mich., and Portland, Ore., announce a new Model "DN" low-



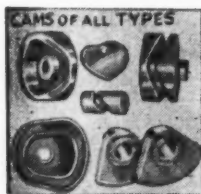
LARGE LATHE Work To Your Order



SEND B-P FOR ESTIMATING

EISLER ENGINEERING CO., INC.

762 SO. 13th STREET



CAMS

TO YOUR

SPECIFICATION

NEWARK 3, N. J.

priced, precision knife grinder, featuring a new automatic table drive transmission developed exclusively for this type and size of machine which incorporates timing belt drive. The manufacturer states that this drive is positive, quiet, non-slipping and eliminates a complete train of gears, which drive minimizes wear, due to less moving parts, and requires no lubrication. This drive is free from vibration, chatter, reversal shock. The rack pinion shaft is carried on roller bearings and the idler shaft on precision ball bearings, which insure alignment, rigidity, and extremely quiet and smooth table operation.

The new precision knife grinder features forced feed lubrication to table ways. The machine ways, both "flat" and "Vee" are ground to precision tolerances on a specially developed Hanchett heavy duty way grinder. After grinding, the ways are lapped and then carefully hand scraped by specially trained men to provide the proper voids for an oil film on the ways.

THE BINGHAMTON

4T SERIES DELUXE

PORTABLE FLEXIBLE SHAFT-GRINDERS



Sanding
Grinding • Drilling
Polishing
Buffing • Reaming
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UNIVERSAL-TYPE Fully Ball Bearing

Flexibility and smooth operation make this durable, dependable unit paramount for maintenance or production. Shaft of rubber casing with steel reinforced ends. Write for sizes and prices.

Flexible shafts available for your motors.

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SPECIFY KASSON PRECISION COLLETS AND ATTACHMENTS

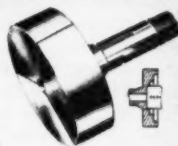
IMMEDIATE DELIVERY FROM STOCK



3AT, 3C
1A, 4C
5C

480
(AC-50)

All collets
in hexagon,
square and
round.



KLUTCH-KOLLET

Step collet for accurate chucking to $2\frac{3}{4}$ " dia. Soft head for easy boring. Lowest price on market! Models 3AT, 3C, 5C.

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CRAFTSMAN • SHELDON LATHES, ETC.

LEVER-TYPE DRAWBAR $\frac{1}{2}$ " cap.



Positive grip on undersize, oversize or standard diameter work! Patented coordinate cams eliminate fingers.

Let us quote on your quantity orders for any type of collet, live center or other machine tool attachment!



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DRAWBAR
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(Ball Bearing) Double
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o Precision

KASSON Precision products are guaranteed unconditionally for accuracy, fit and long life. Your dealer should have them . . . Write us for literature!

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Integrity Since 1919

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Lewis announces plastics machine

Development of a plastics injection molding machine designed to meet the requirements of the rapidly-expanding plastics industry was announced today by James T. Lewis, Jr., president of Lewis Welding & Eng. Corp., Dept. BB, Bedford, Ohio.

Features of the new machine include a multiple packing of the injection cylinder, a quick mold release for nozzle clearance and the "Hydra-Lock," a new method of clamping the molds together which is claimed to be one of the most important mechanical contributions to the art of molding in many years.

The machine employs a straight bore,



externally heated injection cylinder. The plastic material enters by gravity and is packed into the heating section by multiple injection strokes. This pre-packing serves to compress the

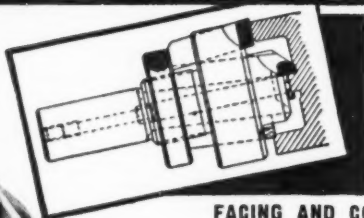
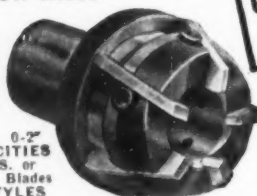
GENESEE

COST CUTTING MULTIPLE OPERATION TOOLS

**HOLLOW MILLS • UNDER-
CUTS • FACES • CHAMFERS
BORES AND SPOT DRILLS**

**ADJUSTABLE
HOLLOW MILLS**

STD. 0-2"
CAPACITIES
H.S.S. or
T.C.T. Blades
10 STYLES



Your production tool problems are our problems. That's the reason many manufacturers turn to our engineering department for confidential assistance. Experience gained from more than 40 years of "know how" is yours for the asking. Write today for Catalog 48-H.

FACING AND COUNTERBORING TOOLS

STD. 1/4" to 4"
DIAMETERS
INTERCHANGEABLE
PILOTS H.S.S. or
T.C.T. BLADES



- ADJUSTABLE HOLLOW MILLS
- FACING AND COUNTERBORING TOOLS
- SPECIAL PRODUCTION TOOLS

GENESEE MFG. CO., INC.
566 HOLLENBECK ST.
ROCHESTER 4, NEW YORK

material, reducing the bulk factor, and insures maximum injection of the plasticized material.

The injection of the material into the mold is compensated electrically. By proper adjustment of the control circuits, the machine is set so that the heating chamber is starved by a small amount on each stroke until it strikes a limit switch which causes its return to a point of maximum retraction.

From this point the process of progressive starving continues again and so the machine completes its feed and injection in compensated balance.

The available injection pressures are readily adjustable from practically 0 to a maximum of 20,000 pounds p.s.i. In special instances, this can be increased to 30,000 lbs. p.s.i. by reducing the diameter of the injection plunger.

The clamping mechanism of the machine embodies three principal elements. A toggle linkage advances the platen, on which the moving half of the mold is mounted, to a position wherein the mold faces are open only a fraction

of an inch. The toggle mechanism serves as a mechanical locking device to hold the platen in the closed position.

Incorporated in the platen structure is a 16" diameter hydraulic cylinder, actuated automatically through the control circuits, which does the final closing of the molds and supplies the final locking pressures.

The stroke of the large cylinder is so short that only a fraction of a gallon of oil and a few tenths of a second's time are required for this part of the clamping cycle.

This high clamping pressure of 200 tons is necessary to resist the high injection pressures which the machine can develop.

Grinding wheel dresser

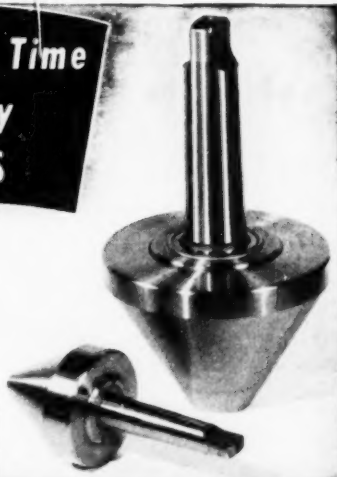
The grinding wheel dresser Model No. 6, made by L. Newman, Tool Die and Machine Works, Dept. BB, 1001 24th St., Oakland 7, Calif., is a universal model; it is flexible and can be bolted down for cutter grinders or cylindrical grinders or can be used on the magnetic

PERFECT ALIGNMENT Every Time with ROOFE Heavy-Duty BULL NOSE CENTERS

• Two double rows of quality bearings in the large and small ends of the nose of this live center are your assurance of perfect alignment on any type of work.

Two shank sizes provide diameters from ½" to 7½" for a wide range of work with a single center.

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HOUSTON GRINDING & MFG., CO., Inc.

2110 QUITMAN STREET • HOUSTON 10, TEXAS

Reliable Distributors Wanted



chuck for surface grinding. The shaft can be tipped all the way forward or backward and the dresser wheel unit can be adjusted up or down or made to swivel on the shaft depending upon the angle desired for dressing or truing

the grinding wheel. Model No. 6, with the N-D1-46 or N-D2-46 wheels is said to be an excellent diamond wheel dresser. All Newman replacement wheels are interchangeable on all models, adaptable to many varieties of grinding wheel dressing.

Aro air hoist

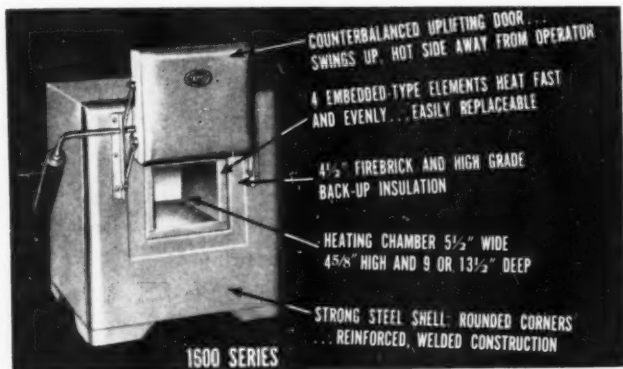
A new air hoist, weighing 27½ lb. with capacity to lift 1000 lb. loads at 40 ft. per minute, is announced by the Aro Equipment Corp., Dept. BB, Bryan, Ohio. The hoist is a roller chain type, powered by rotary vane air motor.

Because of numerous operating advantages, the hoist is said to be suited for a wide range of applications such as loading and unloading on shipping docks, in heat treating plants and departments, in refineries, chemical plants and plating departments, in machine shops and foundries, in automobile, appliance, furniture, textile and aircraft assembly lines . . . and handling bar stock in stock rooms.

Operator can regulate the rate of lift by throttle control which is infinitely

solve heat-treat problems

with versatile
Temco bench-
type furnace



Step up production, cut costs with Temco electric furnaces for heat treating dies, parts, tools, etc. Model illustrated above one of eight convenient sizes available with either electronic or manual temperature controls. Economical,



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easy to install and operate, low cost. Priced from \$55.00 to \$507.50. Write for literature and nearest dealer's name.

THERMO ELECTRIC MANUFACTURING CO.

486 HUFF ST., DUBUQUE, IOWA

How TO SHORTEN SET-UP TIME!

The time required to set up a machine for a tapping or reaming job is reduced considerably if you use a Ziegler Floating Tool Holder.

This is because, with a Ziegler Holder, the set-up does not have to be so accurate. Even if the spindle is out of alignment as much as 1/32", the Ziegler Floating Holder compensates for the inaccuracy, enabling the machine to perform perfect work.



W. M. ZIEGLER TOOL COMPANY
13570 Auburn, Detroit 23, Mich.

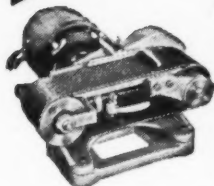
Ziegler
ROLLER
DRIVE

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FLOATING HOLDER
for Taps and Reamers...

DOES IT BETTER
DOES IT FASTER

2



SIMPLEX-M ABRASIVE BAND GRINDER

The precision of a machine tool plus the durability of a workhorse. Complete with 1/2 H.P. Heavy Duty Motor and automatic band tension control. Nothing like it for finishing metals, plastics, wood, fibre, etc.

OTHER STYLES AND SIZES IN NEW
MANUAL ON FINISHING—WRITE TODAY

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Look to **SID TOOL** for your
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**American
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We maintain the largest and most complete stocks of **AMERICAN Drill Jig Bushings** in the East... Hundreds of types and sizes, including specials to your specifications. **IMMEDIATE DELIVERY!** Catalog and prices on request. Let us put you on our monthly mailing list!

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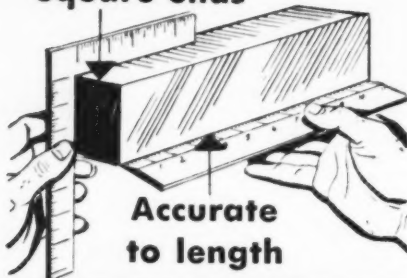
GROBET CHATTERLESS COUNTERSINKS

Six staggered cutting edges give shearing cut that eliminates all chatter.

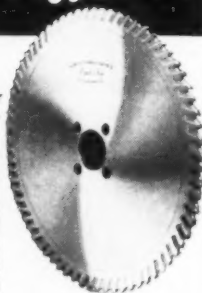
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GROBET FILE CO. OF AMERICA, INC.
421 Canal Street New York 13, N. Y.

Square ends



Ask for our Circular Sawing Handbook.



Segmental - 11" through 108" dia.
Solid - 8" through 20" dia.

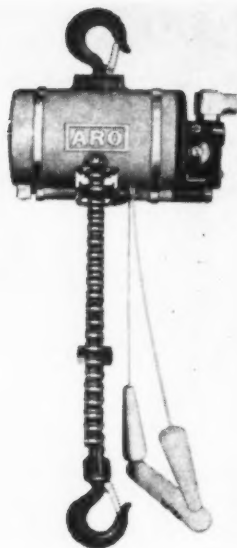
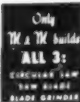
Down with scrap! Up with usable production! Whatever the material or shape or size, Motch & Merryweather has a segmental or solid blade for the job. You get highest practical speeds, ends square and burrless, cut-off pieces meeting close tolerances. Resharpen repeatedly at low cost. Obtain Triple-Chip long life and economy.

THE MOTCH & MERRYWEATHER MACHINERY CO.

715 PENTON BUILDING
CLEVELAND 13, OHIO



REMEMBER - IT'S THE COST
PER CUT THAT COUNTS!



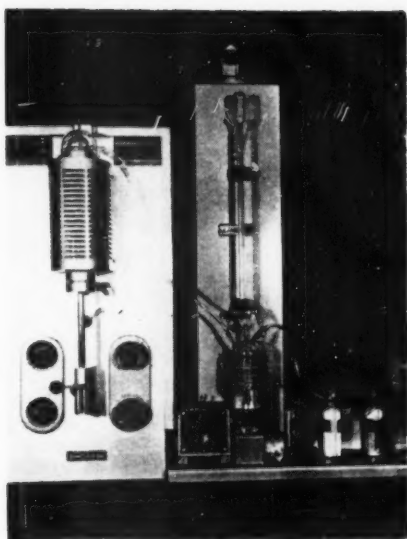
variable from 0 to 40 ft. per minute. This permits inching the load where required. Also, the hoist is designed so that it will not slip down before going up. Due to the vane type motor, the load can be lowered with safety and complete control at speeds exceeding 100 ft. per minute.

The hoist meets requirements for explosion-proof operation. It also has safety snap hooks, top and bottom, adjustable safety stops on chain to limit the lift and descent, and a safety brake which automatically locks when control is released.

Radio frequency heating provides new method of measuring carbon and sulfur in iron and steel

Now carbon and sulfur contents in all types of ferrous alloys are said to be determined by means of a newly developed procedure introduced by the Laboratory Division of Lindberg Eng. Co., Dept. BB, 2450 West Hubbard St., Chicago 12, Ill.

The new unit, which employs radio frequency inductive heating, tests for both carbon and sulfur in a single op-



eration in ten minutes. This represents a time saving of 22 to 25 minutes over conventional methods.

The Lindberg high frequency combustion unit is capable of heating samples to temperatures above 3000 F... substantially higher than previously practical with resistance element furnaces. Heat is generated only in the relatively small metal sample. Thus tubes, crucibles and other adjacent parts are heated only by conduction or radiation from the comparatively small mass of the sample.

New Allen dial feed tables

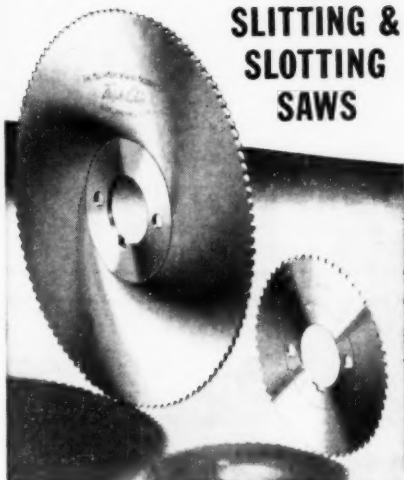
The A. K. Allen Co., Dept. BB, 57 Meserole Ave., Brooklyn 22, N.Y., announces the manufacture of its new model 11FA and 11FB dial feed tables with positive lock feature. The major engineering advance of this new table is that the top plate cannot override and lose index under the most severe conditions of operation. This is achieved by the use of an auxiliary air cylinder built inside the table whose function is to bring into a toggling position, a set of mechanical members which lock the feed pawl to the ratchet in a positive fashion. In the indexed position a newly

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NO BINDING —**

with **MOTCH &
MERRYWEATHER**



**SLITTING &
SLOTING
SAWS**



The Motch & Merryweather Triple-Chip Method clears the way to faster results in milling operations. Alternately ground paired high and low blade teeth form curling, self-clearing chips which relieve stresses and minimize breakage. Saws produce more work and more accurate work and "live longer".

* * *

THE MOTCH & MERRYWEATHER MACHINERY CO.

715 PENTON BUILDING
CLEVELAND 13, OHIO

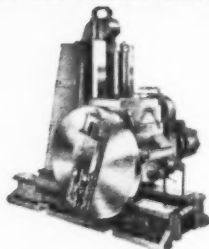


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PER CUT THAT COUNTS!**

Only
M's TM builds
ALL 3:
CIRCULAR SAW
NEW BLADE
BLADE GRINDERS

FORNEY

BORING AND FACING MACHINES



1st and FINEST

Machine features a spindle housing as motor power unit which moves directly into work face. Results in more accurate work, more power and rigidity in cutting tool. Facing head capacity to 66 inches. Weight of standard machine 15,000 pounds.

FORNEY'S INC.

Manufacturers of Special Machinery Since 1916
P. O. Box 1, 310 New Castle, Pa.



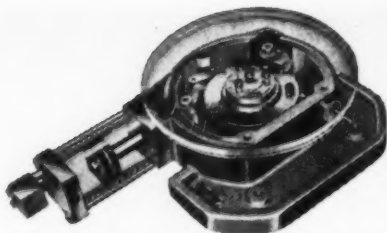
waiting for you

Gone are the days when you had to wait for delivery on most punches and dies while they were made to order. Now they wait for you.

You can order for **immediate shipment** from our stock 76 styles of punches and 65 styles of dies in round, flat, oval, and square sizes to fit most makes of presses.

Besides this saving of time, you save money. Send for our catalog sheets and check the lists of immediately available sizes and their prices.

T. H. LEWTHWAITE MACHINE CO.
312 East 47th St. New York 17, N. Y.



designed anti-back-up pawl locks the table against rearward rotary motion.

A hydraulic check is offered as an accessory and provides a controllable shock absorbing effect at the end of every index stroke for operations requiring extra smooth operation.

Both models are available in the standard 4-6-8-12 and 24 set of indexing positions. Accuracy of indexing is guaranteed to $\pm .002$ measured at the periphery of the 11" top plate.

Model 11FB is identical to model 11F except for the addition of a two-way valve and a pilot timer valve to make the table operate fully automatically as a self-unit.

Greenerd ARBOR PRESSES

For Assembling
Keyway Cutting
Broaching
Piercing
Oil Grooving
Straightening
Forming
Pressing
And many other
jobs

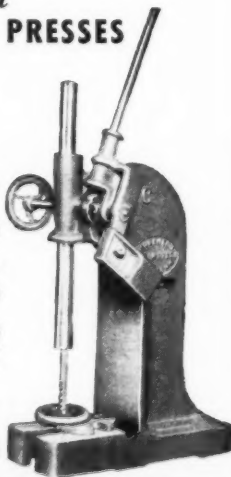
65 Standard styles
and sizes

From 1/4 to 35 tons
pressure for manu-
ally operated
presses

From 1 1/2 to 30
tons pressure for
motor driven hy-
draulic presses

Originators of the
Arbor Press

Send for Cat. 40-H



GREENERD ARBOR PRESS CO.
141 CROWN ST. • NASHUA, N.H.

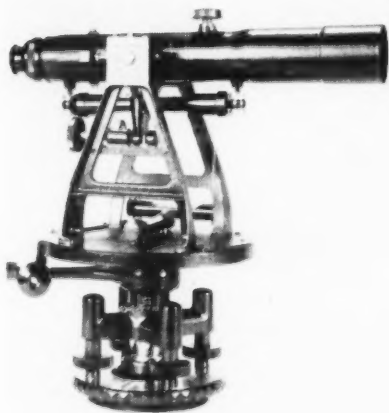
Optoplane new Gurley transit

The Optoplane, a new industrial model of the Gurley precise transit for facilitating jig and fixture location and alignment, has been added to its line of transits by W. & L. E. Gurley, Dept. BB, Troy, N.Y., 108-year-old manufacturer of engineering and surveying instruments.

The Optoplane, developed in cooperation with aircraft plant engineers, will have numerous applications in many industries. Among these are the aircraft, automotive, paper processing and heavy construction industries.

Already in use by plane builders, the new Optoplane establishes the horizontal and vertical planes necessary in locating and setting up jigs for sectional assembly. Built to the precision of the best engineers' transits, the Gurley Optoplane is said to permit jig alignment and coordination within tolerances of thousandths of an inch.

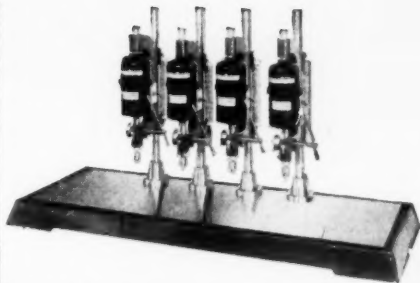
The new instrument does not incorporate a vertical circle or horizontal



limb, since angles are not required in jig assembly.

Specifications of the Optoplane:

Telescope—11½ inches long, erecting,

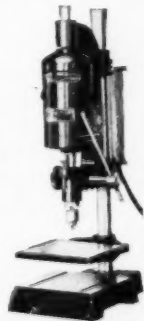


EFFORTLESS, ACCURATE SMALL HOLE DRILLING

For a decade Electro-Mechano machines have been used successfully by leading manufacturers. Proven design for small hole precision work includes:

- Super accurate chucking with choice of three types giving runout of .001", .0005" or adjustable to absolute concentricity.
- Minimum side play through use of smaller precision spindle bearings and widely spaced-quill bushings.
- The exact speed for best drilling with continuously variable speed control: 150 to 4000 RPM, 1000 to 10,000 RPM or 2500 to 15,000 RPM.
- Minimum vibration—high speed units have direct motor drive, no belts.
- Special slow quill feed on dual feed models for drilling below No. 60. Air feed models with hydraulic control for high production small hole drilling.

Replace your old drilling equipment with top efficiency Electro-Mechano Precision Drilling Machines. Your drilling problems and inquiries are welcomed.



WRITE FOR LITERATURE:

THE ELECTRO-MECHANO CO.

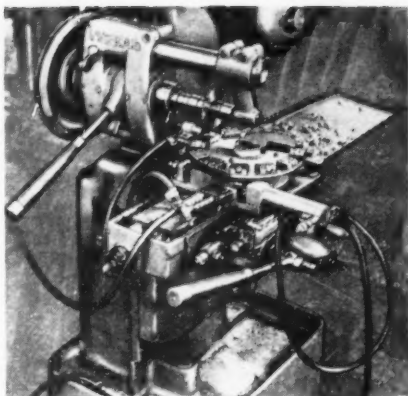
263 EAST ERIE STREET

MILWAUKEE 2, WISCONSIN

magnifying 22X, 1.31" aperture, 4 seconds resolution, 1.3 degrees field of view; minimum focus, 3 feet; special glass reticle. Level vials—reversion telescope level, 6 inches long, sensitiveness 30 seconds; plate levels, 3 inches long, sensitiveness 60 seconds. Weight of transit—9¼ lbs.

Hand miller air feed

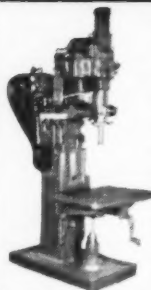
This shows a simple but unusual application of a Mead rotary work feeder which, although only partially automatic, is said to save a great amount of time. It is made by Mead Specialties Co., Dept. M-6, 4114 N. Knox Ave., Chicago 41, Ill. The operator's left hand works the mill table lever, while his right hand places the brass plugs on the rotary table. The sequence is as follows: (1.) milling machine starts forward, and air line to rotary work feeder automatically opens; (2.) rotary work feeder indexes to next station; (3.) simultaneously auxiliary valve on work feeder admits air to H-1 Midget air clamp at work station, which locks the work piece in its nest just before it



passes under the cutter; (4.) when mill table returns to starting point, it trips FC-2 limit valve, which shuts off air from rotary work feeder, which is then ready for the next cycle; (5.) cam mounted on stationary hub of work feeder ejects the finished pieces as they pass.

The compact design and low silhouette

KAUFMAN TAPPING MACHINES



Kaufman specializes in tapping machines—every machine precision-built to meet the requirements of individual production jobs. Designed with fully automatic cycle, single or multiple spindle heads and other most advanced features.

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TOOL HOLDER



Exclusive vise grip jaw runs full length of cutting channel... hugs bit so it can't rock, chatter, slip, sag or break... permits faster feed, deeper cuts! Holds all sizes—square, round, undersize or narrow bits for cutting off or special forming operations. Also available with 15° cutter channel for H.S.S. tool bits.

For complete information call your Clark Cutter Jobber now or write Factory B

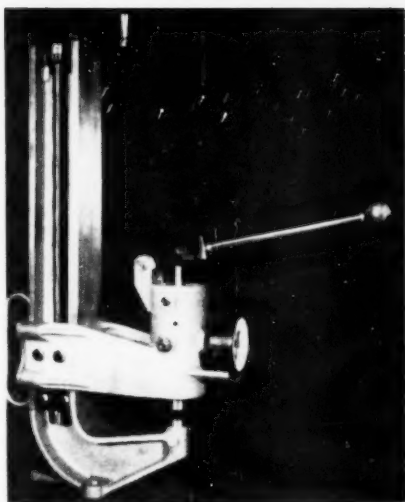
ROBERT H. CLARK COMPANY
9330 Santa Monica Blvd. • Beverly Hills, Calif.

Manufacturers of Precision Cutting Tools

ette of the Mead rotary work feeder make it particularly well adapted to this type of operation.

Blosjo "Porta-Brinell" hardness tester

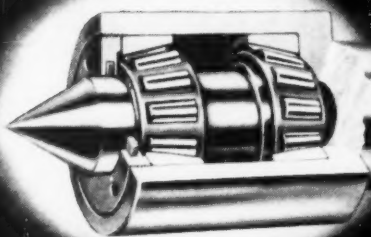
The Blosjo "Porta-Brinell" made by Blosjo Enterprises, Dept. BB, 5310 Golden Valley Rd., Minneapolis 22, Minn., makes a positive hardness test, the manufacturer claims. A special penetrator makes an impression at a controlled hydraulic force of 500 kg. The impression is read with a standard Brinell microscope and translated to Brinell hardness. Range of tester is 20 to 500 Brinell with maximum accuracy over the full capacity of the machine which is a 12" gap and 4½" throat. Frame of tester is a rigid I beam construction. Tester weighs 17 lbs. It works in any position and in portable testing the work is clamped between the cylinder housing and anvil. The penetrator is then forced into the work from a retracted position within the cylinder body and again retracted before un-



clamping. This results in an unmarred impression. When bolted to a bench a sturdy stationary tester is obtained.

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for
**lathe and grinder
tail stocks**



Accurate, low cost turning on tough continuous-run work. Preloaded, matched roller bearings assure rigid set-up. Precision ground shank. Heavy-duty grease seal. Many exclusive features.

FREE BULLETIN 105

"What you should know about LIVE CENTERS"

FALLS PRODUCTS, INC., 122 Genoa Street, GENOA, ILL., U.S.A.

Advanced design in live center

The Bultool Co., Dept. BB, Box 5094, Southfield Sta., Detroit 35, Mich., announces the development of an advanced design live center, spring-loaded tool featuring super-precision preloaded journal bearings for high loading capacities while sustaining maximum rigidity.

The high speed steel tool point, ground under loading in its own bearing, is said to maintain a guaranteed concentricity of .0003" total indicator reading. Called Bulflex, Model FHH, it is heavy-duty built to withstand extremely heavy radial loads. Knurling against the Bulflex cannot disturb its accuracy. This same feature guarantees reduced loading time per piece as no

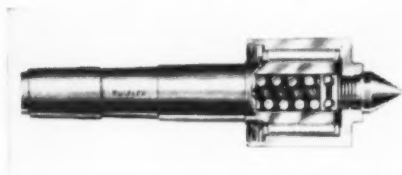
delicate adjustment of center is required.

The scientifically proportioned massive roller journal bearings, claimed to be preloaded for years of absolute operating radial rigidity, preclude breakage or early bearing failure that may result from uncontrolled end thrust due to heat expansion of work at high cutting speeds or excessive pressure from tail-stock screw. The radial bearings of Bulflex live centers take no thrust load and thrust bearings are spring loaded. Always solidly pressed against the work, Bulflex is permanently chatter-free.

Bulflex-FHH requires no lubrication; an exclusive design feature is the neoprene oil seal at back of head protecting it from chips, dust, scale and coolants.

Drill speed-changer

Boyd Machine, Inc., Dept. BB, 711 E. 4th St., Royal Oak, Mich., manufacturer of machine tool accessories, announces a new drill press speed change mechanism—the Vari-speed changer. Designed to fit any 17" to 20" drill

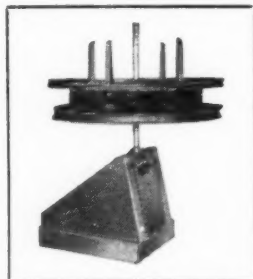


MOSLO "SHIFTWEIGHT"

COUNTER-BALANCED WIRE REELS

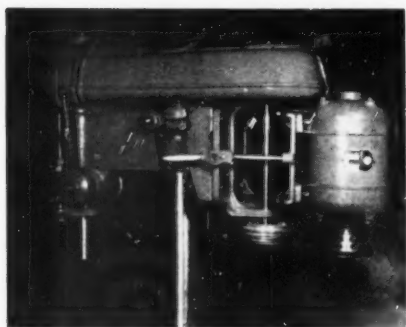
Takes the Manual Labor out of loading a Reel with Wire. Just unlock the knurled spindle by a twist of the wrist, tilt the reel assembly 90°, roll coil of wire to reel, lift 6" on to centering arms, release lock by twist of wrist, use spindle as lever to lift, and the **Weighted Counterbalance does the rest!**

Capacity 300 lbs. — Min. Coil I.D. 10" — Max. O.D. — 41" All welded steel construction — Brake Equipped.



MOSLO MACHINERY, INC.
2443 PROSPECT AVENUE

Immediate Delivery
\$190.00 F.O.B. Cleveland
CLEVELAND 15, OHIO



press, the Vari-speed changer is said to enable the operator to change speeds with a minimum of time and effort simply by releasing a toggle action lever and slipping the belt to the proper pulley step. The unit allows for speed changes from 125 to 4000 r.p.m. with a 1725 r.p.m. motor.

Made of heavy cast iron, the Vari-speed changer is shipped in one unit and uses the belt supplied with the drill press. It does not interfere with the

belt guard and is shipped with pulleys and second belt.

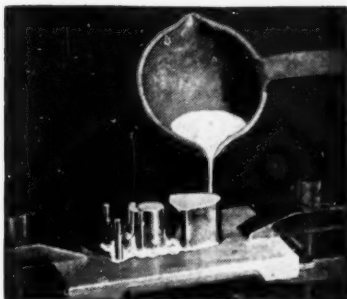
Fast charger

The Baldor Electric Co., Dept. BB, 4353 Duncan Ave., St. Louis 10, Mo., announces development of a dual volt-



CUT DIE MAKING COST WITH CERROMATRIX

Leading American and European manufacturers use the fast accurate Cerromatrix Method of locating punches in relation to dies, without machining non-working surfaces to close dimensions. Dies and punches permanently secured for long runs.



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CERRO DE PASCO CORPORATION



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The **P-M** Single and Multi **STEP DRILL**



For further information write

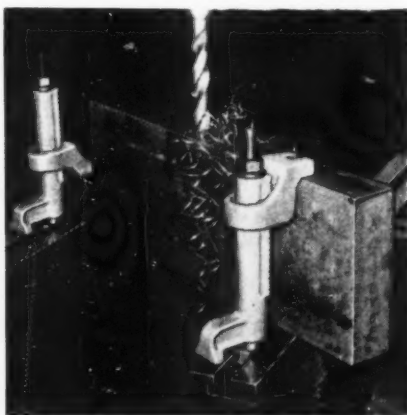
P-M COMPANY
147 GRAND ST. • NEW YORK 13, N. Y.

age fast charger which is said to charge a six volt battery at a rate of 80 amperes or less and, in addition, charge a twelve volt battery at a rate of approximately 40 amperes. Additional features include first grade ammeter, light weight—approximately 30 pounds, and an arrangement under which the time switch automatically shuts down the fast charge to a safe soaking charge when it runs to a "O" position.

Clamp-All for radial drilling

Clamp-All, a simple device for quickly and securely clamping large or small work on radial drill presses and several other machine tools having T-slots beds, is announced by Clamp-All Co., Dept. BB, 895 Montford Road, Cleveland 21, Ohio.

Said to eliminate the need for blocks, bolts, washers, nuts, etc., the Clamp-

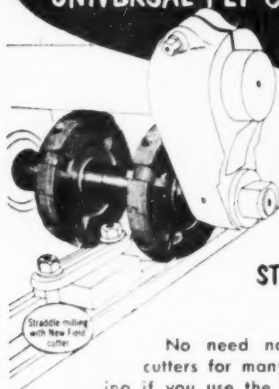


All provides a rigid, vise-like grip. It holds practically any size or shape which has clamping surfaces within $\frac{1}{4}$ " to 11" from machine bed. Simple adjustment and locking features reduce setup time.

Horton J-type chucks in full production

The E. Horton & Son Co., Dept. BB, Windsor Locks, Conn., is now delivering its new line of jet type chucks for jet engine machining. These chucks were introduced recently to special

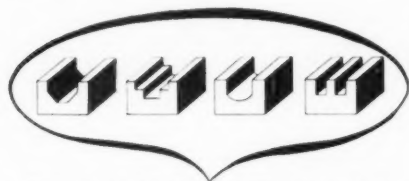
New-Field UNIVERSAL FLY CUTTER



**MAKES 4-6
CUTS IN ONE
OPERATION!**

**USES
STANDARD BITS!**

No need now for special cutters for many types of milling if you use the New-Field Universal Fly Cutter. One New-Field cutter using any type of high speed steel or carbide bits makes multiple cuts in one operation. Standard bits are easily reground or replaced when needed for other work. Down time is cut to minimum.



These are only a few of the many different types of cuts possible with a New-Field Universal Fly Cutter

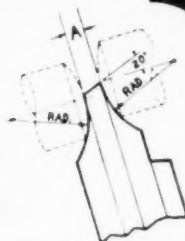
New-Field Cutters fit all standard arbors on horizontal or vertical mills or drill presses, turn to any required speed, have adjustable bits to permit slots of any shape from 3/16" to 2" for fly cutting, slotting, surface and straddle milling, gear cutting, disc and gasket cutting. Available in 4", 6", 8" and 10" sizes, also 6" and 8" heavy duty size designed especially for Shell End Mill Arbors. Write today for details on this versatile, money-saving tool!

NEW-FIELD MACHINED PARTS CO.

210 W. 7th St., Los Angeles 14, Calif.
Export office: States Trading Co., 401 Broadway, N. Y. 15
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DOUBLE CROWN



No. 00 B & S

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1/8	\$7.50
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1/4	\$7.50
5/16	7.75
3/8	8.00
7/16	8.25
1/2	8.50

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Rad.	Price
1/4	\$ 8.50
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3/8	8.50
7/16	9.00
1/2	9.50
9/16	10.00
5/8	10.50

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Other standard radius tools from

Stock: Front Crown

Rear Crown

Radius (90°)

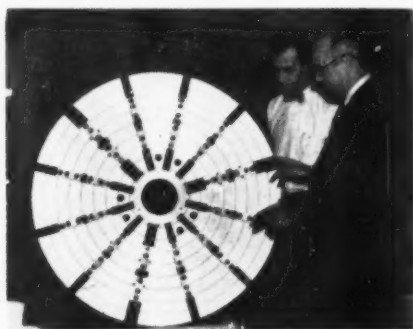
These H.S.S. tools assure uniform, correct radii, better finish and appearance, less set-up trouble and maximum production at lowest cost. Full line of standard tools also available. **SEND FOR LATEST PRICE LIST.**

SOMMA TOOL CO., INC.

21 BROWN ST. WATERBURY, CONN.

manufacturers of jet engine parts such as shroud rings, rotor compressor discs, and other thin walled sections with suitable holding means, especially on parts which are "out of round" or stress relieved.

Illustrated are D. H. Thomson, vice-president (left) and George S.

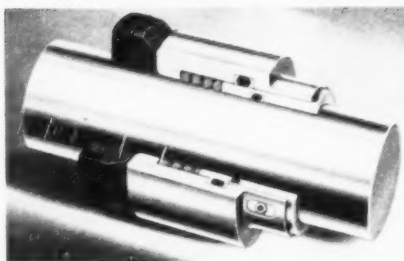


Chiamonte, sales manager of Horton Chuck Division of E. Horton & Son Co., examining a 12 jaw pinch type chuck 42" in diameter. Horton also makes in its J type series a 6 jaw scroll combination in sizes up to 36" in diameter which is especially designed to be used on right angle lathes. Both chucks are made to fit directly on American Standard spindle noses or with straight recess for mounting with adaptor plates.

Simplicity of design in "O" ring seals

Simplicity of design is an important feature of Garlock's new "O" ring mechanical seals for rotating pump shafts. The small number of parts affords easy manufacturing adaptability of this improved seal to withstand any liquid, whether mild, harmfully corrosive or extremely hazardous, on rotating pump shafts. They're manufactured by The Garlock Packing Co., Palmyra, N.Y.

These "O" ring seals are designed to provide leakless operation of rotary shafts on centrifugal pumps handling



chemicals, petroleum products, edible liquids, pulp liquors, and many other liquids. They are furnished in Type O, an unbalanced seal for pressures up to 200 p.s.i., and in Type OB (illustrated), a balanced seal for pressures up to and over 1,000 p.s.i. Both types can be supplied with single spring or multiple spring, and in either pin-drive or sleeve-drive construction.

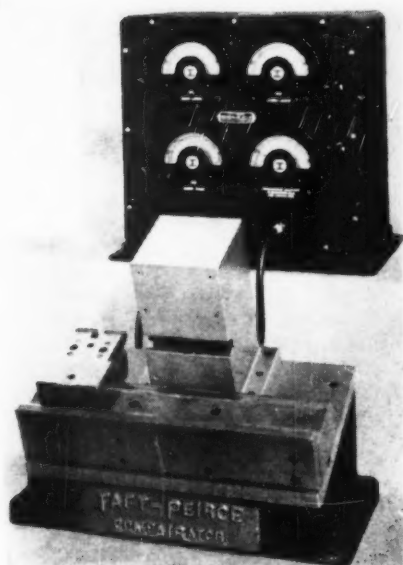
Type O seals are furnished for packing spaces $\frac{5}{16}$ " and larger. In some cases, Type O seals can be made for $\frac{1}{4}$ " packing space. Type OB seals are furnished for packing spaces $\frac{3}{8}$ " and larger.

The "O" rings are available in "Teflon," Buna-N, Neoprene, or Silicone. The parts contacting the liquid can be furnished in any suitable metal.

Inspects jet parts

The Taft-Peirce Mfg. Co., Dept. BB, Woonsocket, R.I., has just completed an unusual inspection gage for a prominent aircraft jet engine manufacturer. This air-operated gage measures the dimensions over rolls of serrations in the root section of jet engine turbine blades.

The gaging fixture is made with tungsten carbide contacts, precision ground to a radius corresponding to the required roll dimension. These contacts are mounted on parallel reeds so that they are free to move in both a vertical and a horizontal direction. This permits the measuring contacts to position themselves correctly, regardless of



any permissible lead variations that may exist in the serrations.

Three air indicators, with dial graduations of .0001", show dimensions as measured over rolls on each of the three serrated sections. In addition, the new Taft-Peirce computing indicator has been incorporated as a fourth indicator to compute automatically the difference between the amounts that each of two dimensions varies from its mean value. The inspected part is rejected whenever the computing indicator shows this variation to be greater than plus or minus .001". Furthermore, this two-point contact enables an inspector to explore any taper from end to end of the slots.

Taft-Peirce has built two of these air gaging units. The first is designed so that a grinding machine operator can gage the part while it is still in the grinding fixture, thereby eliminating many costly rejects. The second unit has been designed as a final inspection gage to check the finished part.



**Sensitive
Universal**

RADIAL DRILL

**PRICE
COMPLETE
\$575.00
F.O.B.
N.Y.C.**

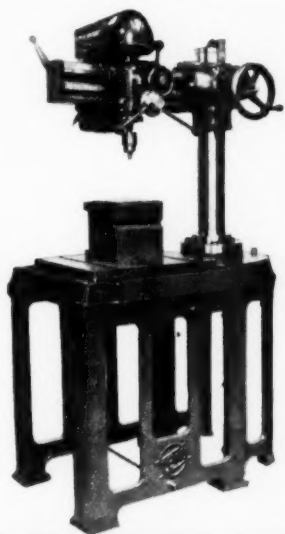
1/2" Drill, cap. speeds up to 3600 RPM
Dist. Spindle to column—21"
Dist. chuck to base—16 1/2"
Precision Spindle, Ball Bearing Mounted
Rugged Construction, Weight 700 lbs.
Complete Spare Parts Inventory
NO PRIORITIES NECESSARY

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Swedish universal planing machine four in one

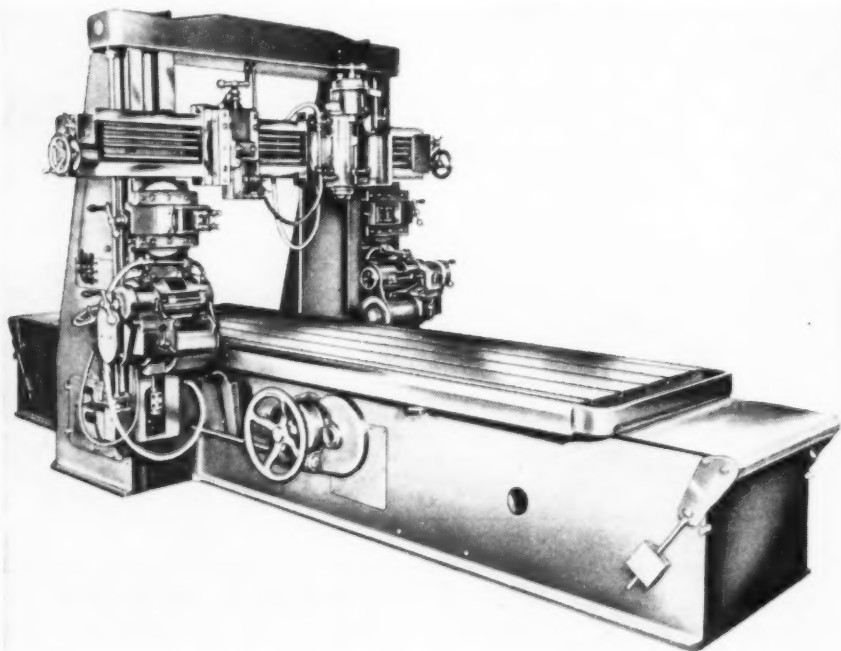
The United Machinery Sales Co., Dept. BB, 2351 N. St. Louis Ave., Chicago 47, Ill., announces distribution of the Swedish System Taube-Sigemo, universal planing machines, Type AB 2, BB 2 and CC 2.

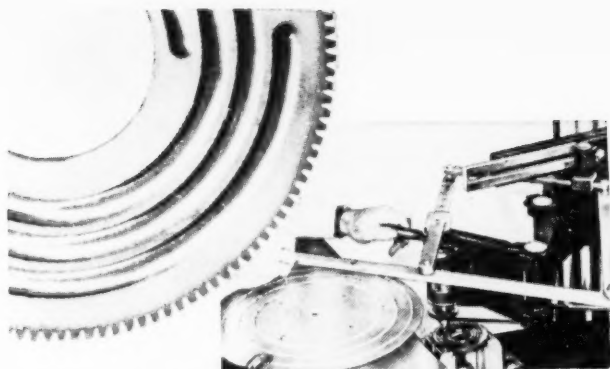
It is claimed that these machines combine the duties of four or five machine tools of the conventional kind (planing, milling, drilling, boring and surface grinding) and represent an improved redesign of earlier machine types. These are equipped with planer toolbox support and independent, direct-driven units for milling and grinding. These units can be placed either on the cross slide or on the side columns and are rotatable in all positions. The design of the machines is based on the principle of affording facilities for performing most

of the planing, milling, drilling, boring and surface grinding work carried out in a machine shop, it is said, in the simplest manner and with the greatest gain of time. The machines may also be used for drilling in fixtures. Lack of vibration is a feature.

The machine comprises a table planer with tool box, combination horizontal and vertical milling machine with adjustable spindle for all intermediate positions and a surface grinding machine with spindle adjustable for different positions.

Equipment includes the "Ortlinghaus" speed gear and multiple "Sinus" disc clutches, all with preselector for several speeds.





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Catalog H28 Bench Type Model
(weight 200 lbs.)
Portable Model IM also available

Production: 6" brass spiral
with $\frac{1}{4}$ " x $\frac{1}{4}$ " groove cut
from 3 times larger template
Time: 12 units per hour.

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Representatives in all principal cities. Canada—359 St. James St., Montreal

Surveys have shown that 87 percent of the American people now know at least a few of the simple things they should do to protect themselves in the event of atomic attack. This is the result of billions of civil defense instruction messages that have reached the public through newspapers, magazines, radio, television and other media, plus public service activities on the part of many industries and organizations.

BELT DRIVEN CUTTER GRINDER



- Vibrationless
- Ball bearing grinding spindle
- Indexed for 1-4 sided cutters

Write for folder CG-28

NEW HERMES, INC.

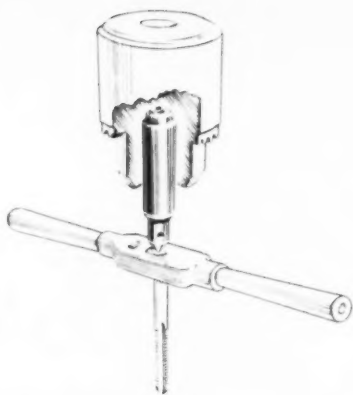
13-19 University Place
N. Y. 3

Jig boring aids

Two new jig boring aids have been announced to the industry by The Medelton Co., Inc., Dept. BB, 335 E. 142nd St., Bronx 54, N.Y. They are the "Tap-Go" spring center and the "Zero" edge locator.

The spring center is said to enable the operator to tap holes perfectly square and in precise location, the simplest possible way, namely, at the same time that the work is drilled.

The "Tap-Go" is an accurately made spring center designed to telescope $\frac{3}{8}$ of an inch while being used in a standard $\frac{1}{2}$ " drill chuck. The alignment is maintained all along the $\frac{3}{8}$ " travel of the center in its housing. It has hard-



ened working parts throughout, to minimize wear and maintain precision alignment.

With the "Tap-Go" it is merely necessary to lower the spindle onto the tap, load the spring, and proceed to tap, using both hands, thus maintaining

Immediate delivery from stock

New END MILLS

(NATIONALLY ADVERTISED BRAND)

1 $\frac{5}{8}$ " dia. — HSS — 8 flute, fast spiral,
 $\frac{1}{8}$ " bevel on end, No. 9 Brown & Sharpe
taper shank tapped for draw rod.

\$5.00

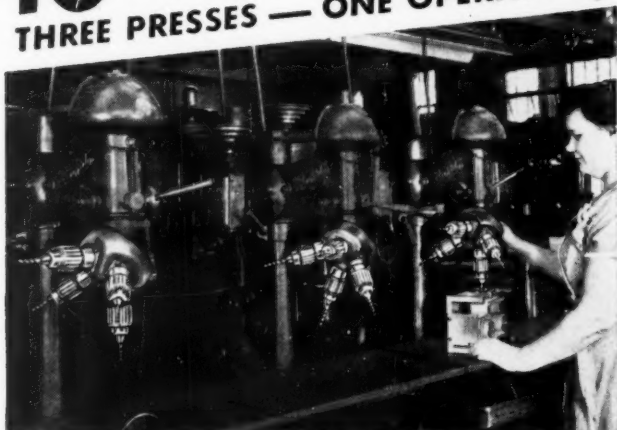
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HAYNES TOOL COMPANY
1617 VESTAL ROAD VESTAL, NEW YORK

16 HOLES -- THREE PRESSES — ONE OPERATOR!



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ON ANY
DRILL
PRESS

3 QUADRILLS ON 3 PRESSES DO WORK OF
16 SPINDLES AT RING MFG. CO.



Investigate this important
time and work saver.
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QUADRILL

4-POSITION Instantly Adjustable tool drills, taps, reams, countersinks, counterbores — all on 1 drill press with 1 operator. Does work of 4 presses. Costs less than 1 press.

QUADRILL produces more holes faster—No time loss—Cuts production costs 33%.

CHICAGO QUADRILL CO.

1846 BUSSE HIGHWAY, DESPLAINES, ILLINOIS

even pressure and achieving greatest possible accuracy. After tapping $3/8$ " deep, it is simply necessary to repeat as above for further depth.

The "Zero" edge locator is a precisely ground device designed to enable the jig borer operator to quickly locate the spindle over the work edge, to tenths.

In use, the spindle is centered over the work edge by holding the "Zero" on the edge of the work by hand, with the indicator held in the spindle as usual. The indicator is then lowered

into the center of the "Zero" and an even reading is obtained by sliding the "Zero" along the work edge and moving the table at right angles to the edge. The resulting location will be accurate within tenths, it is claimed.

It has the additional advantage of enabling the operator to set the indicator to describe a perfect .5000" circle, which in turn can be used by the operator to locate the spindle in relation to irregularly shaped work surfaces.

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Centers*

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Adapted
for heavy
duty work.
Precision type
ball and roller
bearings assure
maximum capac-
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production and long
service.

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**Suits Your
Grinding
Needs to a**



"T" Square action elimi-
nates usual intermediate
table on alternative mov-
ing spindle housing. Un-
usual accuracy and finish
are obtained. There are
other reasons why you'll
like the Crosman "T"
Surface Grinder . . .
because:

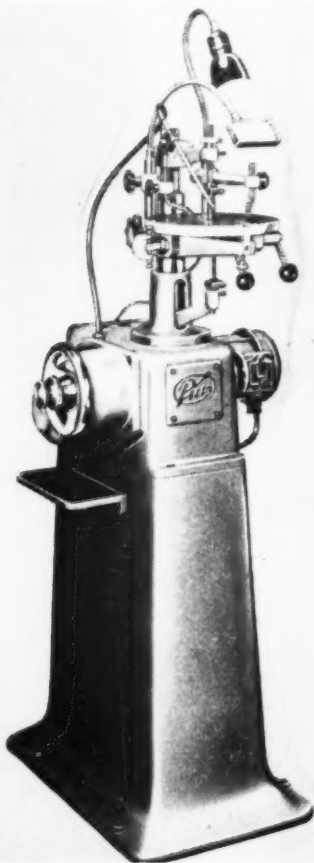
Here's a versatile, handy, accurate sur-
face grinder. Just a few of the uses
are: Chip breaker; grinding and sharpen-
ing carbide tools, sharpening straight and
circular screw machine form tools, also
circular file chisels, thread chaser and
form surface grinder. Prompt Delivery!

Write for Circular A-2 today.

J. B. CROSMAN & SON, INC.
EAST WALPOLE, MASS.

Precision die sawing and filing machine by Cedar West

This precision die saw and filing machine, FM-200, being distributed by the Cedar-West Tool Co., Inc., Dept. BB, 90 West St., New York 6, N.Y., is used for the manufacture of press tool dies, shearing dies, drawing dies, gages,



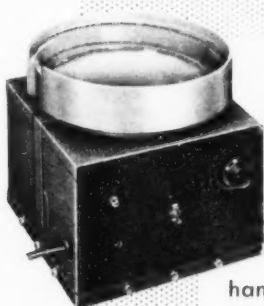
templates, and similar work necessitat-
ing the working out of regular and ir-
regular forms and other suitable work
requiring filing and sawing operations.

Only tension files are being used in
this machine. They are held under
tension between upper and lower file



Large Capacity Feeding of Small Parts

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PARTS FEEDERS



- Fully Automatic
- Parts Fed Single File in Oriented Position
- Rheostat Controlled

Provide accurate high speed handling of small parts to automatic machines and continuous processing equipment. Electro-magnetic operation — Compact, easy to install, low cost.

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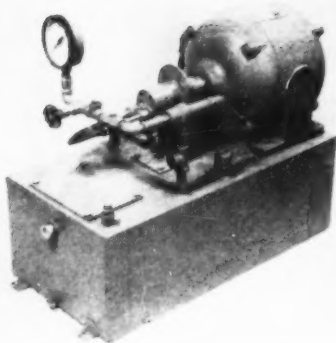
SYNTRON COMPANY
300 Lexington Ave. Homer City, Pa.

holder arm; the upper arm is hinged to enable the operator to swing the arm upward in order to inspect the die. This way the file, which is fastened in the lower holder arm, always stays lined up and does not require resetting after each inspection. The worktable can be tilted in all four directions up to 2° in order to file and saw tapers. All moving parts are hardened and ground for fit. The variable speed drive permits any speed from 110 to 330 strokes per minute.

Compact hydraulic pumping unit

This new hydraulic pumping unit made by Hackett Bros. Inc., Dept. 137-BB, North Manchester, Ind., is applicable wherever there is need for a low cost hydraulic pressure unit.

Design: All steel welded reservoir. Nitraloy gear pump in high strength aluminum alloy case. The unit is completely piped with relief valve, check valve, reservoir filter and air breather



filter. Pressures to 1200 p.s.i. Capacities .8 to 2.8 gal. per minute. This package unit is available with or without motor.

Swedish collet chuck available in 48 models

A new collet chuck, the B & V, is now available in the United States for the first time from Victor Machinery

Exchange, Inc., Dept. BB, 251 Centre Street, New York 13, N. Y. Precision made in Sweden by one of the country's oldest names in machine tools (Eskilstuna Borr-Och Verktygsaktiebolag), the chuck is noted for its simplicity of design and high degree of accuracy. Available with Morse, Brown & Sharpe milling machine taper or with straight shank, the B & V may be used in milling machines, boring mills, drilling, centering or grinding machines, lathes and automatic screw machines.

The chuck is available in a range of 48 models with capacity from 1/8" to 2" depending upon model. It uses a single taper collet with a flat contact surface against the nut, thus holding along the entire length. Overhang is small and maximum run-out is .0004".

The design of the B & V reduces the friction resistance between nut and collet considerably, giving a much better effect in tightening the nut, and thus a more powerful grip on the tool. The part of the collet inside the chuck body is relatively long to give it good

People work better when they SEE BETTER



AT GENERAL ELECTRIC

Magni-Focuser aids precision work on fine armature wires.

MAGNI-FOCUSER's

matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits over regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

MAGNI-FOCUSER

SPEEDS PRODUCTION

Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces eye-strain and prevents squinting—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.

Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

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guidance and has little conicity to insure good clamping. The other end projecting outside the chuck body is short, thus rendering great rigidity. The front part of the collet is shaped into a flange, the diameter of which is somewhat greater than the inside diameter at the front end of the nut.

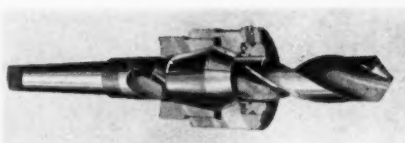
On account of the flexibility of the collet it can easily be forced over the nut flange, thus securing a safe connection between collet and nut. The collet loosens simultaneously with the nut.

Hole depth control is non-rotating

The Wohlnip Eng. Co., Dept. BB, 589 Central Ave., East Orange, N.J., has announced its drill stop for hole depth control that is non-rotating.

The positive collet lock for maximum holding power, thrust bearing and precision construction with hardened wear surfaces are features.

These may be used on drill presses, radial drills, lathes and turret lathes. They may be used for drilling, center-drilling, counterboring, countersinking,



reaming and end milling.

The face of the work, fixture or bushing on which it stops, as spindle is rotating, will not be marked or damaged, it is claimed. It is quickly attached, adjusted or removed in or out of the machine.

New blackening compound

A new ferrous metal blackening compound, known as Dulite 3-0 Black, has been introduced by the Du-Lite Chemical Corp., Dept. BB, Middletown, Conn.

Said to be particularly effective for stainless steels, this compound will produce a nonfading black finish quickly and easily on malleable iron, etc., without special equipment.

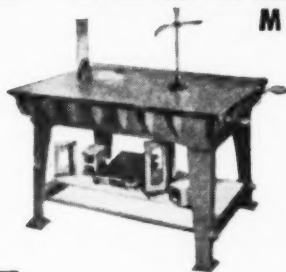
The operating temperatures required for processing with Dulite 3-0 are exceptionally low, the maximum involved being 240° F.

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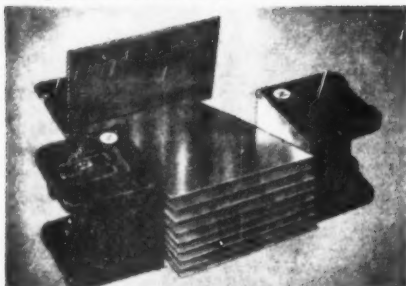
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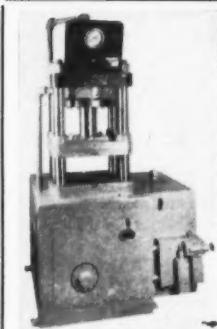
Magnetic floaters



Eclipse magnetic floaters, made by Material Handling Equipment Co., Dept. BB, 141 E. 44th St., New York 17, N.Y., are supplied in pairs, 3" x 3" and 4" x 4". Magnets of suitable strength located at opposite ends of blanks magnetize them similarly so that they repel one another. These permanent magnets will not deteriorate in ordinary service, it is said, and require no wiring.

Of die cast unit construction, they are adaptable for mounting on any type equipment, hand or automatic feed, singly or in multiple units.

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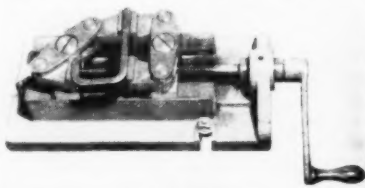
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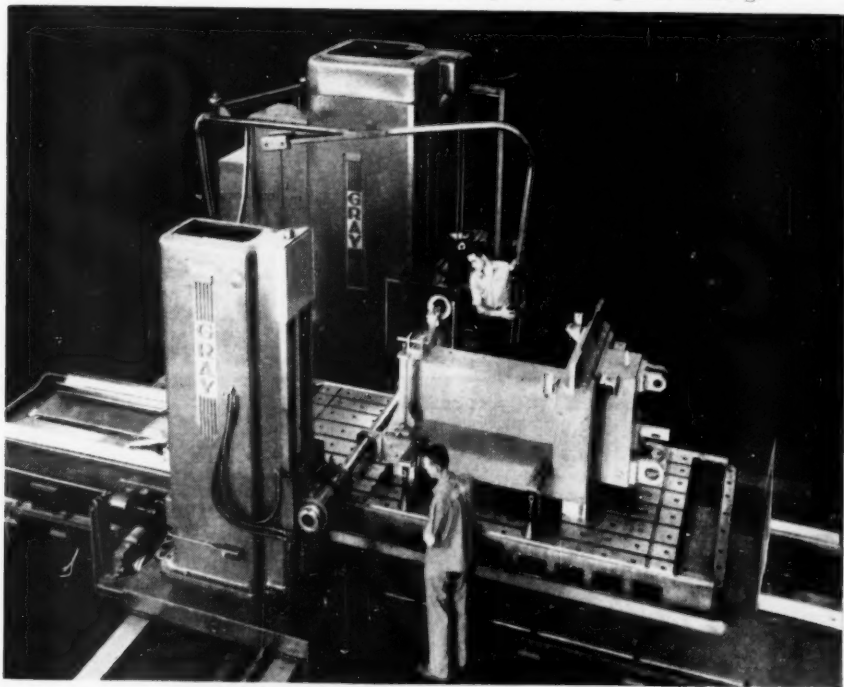
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Gray 6" horizontal planer

The G. A. Gray Co., Dept. 6, Cincinnati 7, Ohio, announces the installation of one of its 6" horizontal planer type boring machines at the Boeing Aircraft Co., Wichita, Kan. Boeing uses it as a toolroom unit to make master gages for B-47 Stratojet bombers, indicating the precision of this machine. The master gages, in turn, are used as the basis for the production gages that are used in daily assembly and machining operations.

The Gray boring machine features a 6" diameter nitralloy spindle. The table will accommodate a work piece 12' long, 6' wide, and 6' high. Precision indexing to limits of less than .00025" is said to be permissible through the Gray electric power precision locating feature. The extreme accuracy of the ways and guide surfaces is protected by the new Gray non-metallic way, which eliminates metal-to-metal contact and virtually insures against scoring.



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SIZES

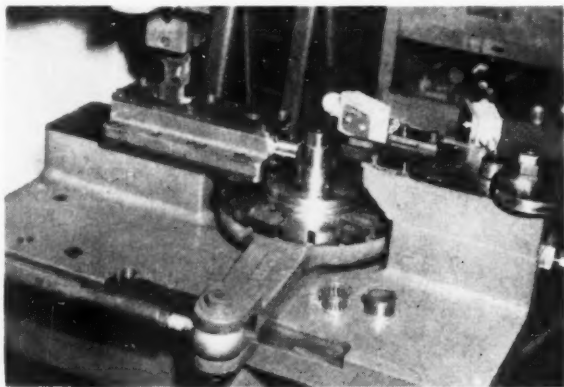


Power press pierces cage of needle bearings

Equipped with a special fixture, a power press has been built to pierce the cage of needle bearings. Operating at a speed of 100 strokes per minute the machine pierces 19 rectangular shaped holes, $7/64$ " wide by $5/8$ " long, in bronze tubing .025" thick.

As designed by the V & O Press Co., Division of Emhart Mfg. Co., Hudson, N. Y., the press punches in a horizontal direction. The tubing blank is placed over a die where it is automatically pierced and indexed for the successive slots. When the required 19 piercings are completed, the machine stops automatically. An 18-ton V & O press was adapted for the application.

Here is a close-up of the V & O power press that is equipped with a special fixture to pierce the cage of needle bearings. The press punches in a horizontal direction.



Boonton, N. J., plant pioneers in carbides

This shows the modern building of the B-M-S Carbide Specialties, Inc., 1000 N. Main St., Boonton, N.J., a tool making plant that has been engaged in manufacturing custom-made Tungsten carbide tools and dies since 1935, helping pioneer in the processing of carbides. Preforming carbides to complicated shapes such as special inserts for punching, forming and cutting tools and adaptations is a specialty. With new methods of bonding to steel, these carbides can now be used in both delicate and simple dies or tools where extreme hardness is needed. Valentine J. Schindelbeck, president, a machine and tool designer who founded the company, is largely responsible for the development of precision methods of producing the new types of carbide tools.



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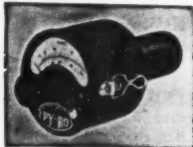
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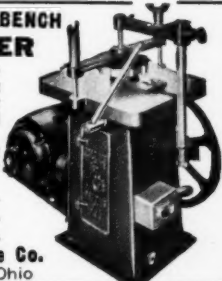
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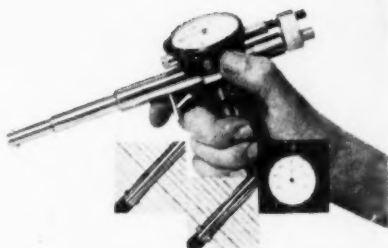
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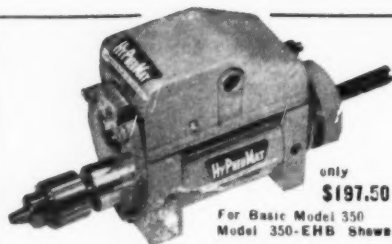
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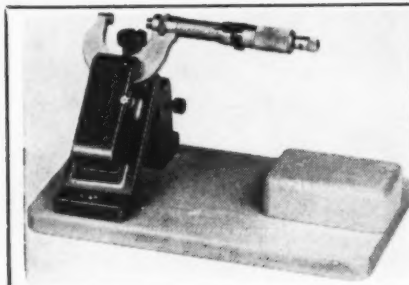
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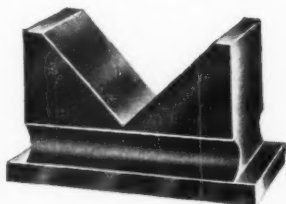
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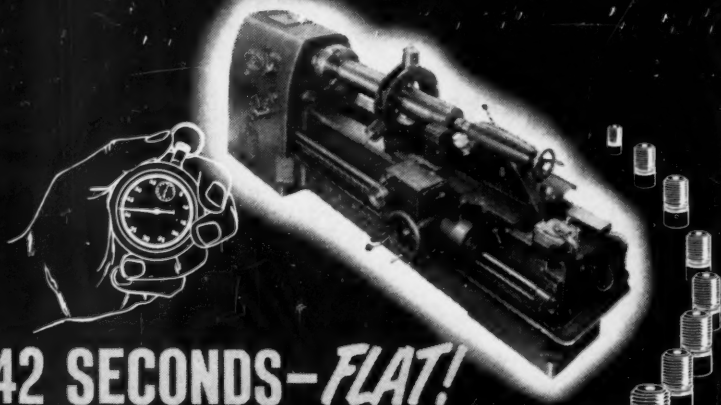
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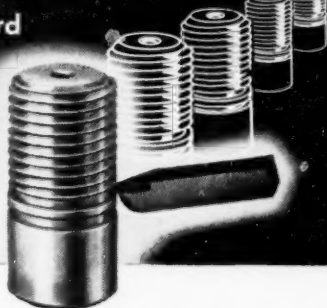




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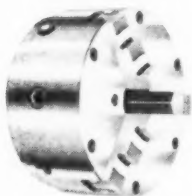


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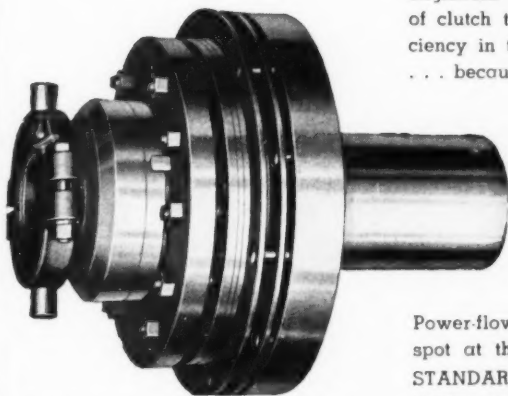


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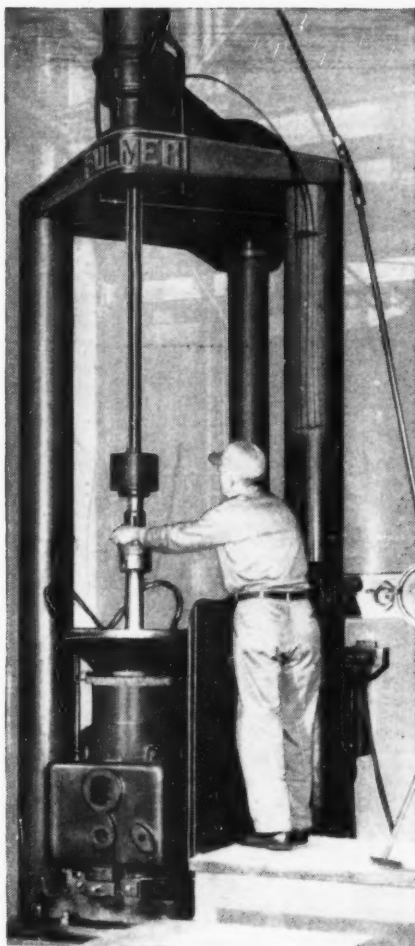


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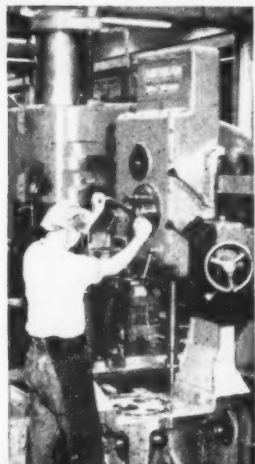
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